# Optos Suzuka DICOM Conformance Statement

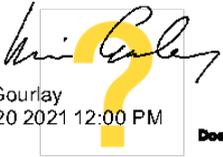Company Name: **OPTOS**

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# 1   Conformance Statement Overview

This document describes the DICOM conformance of Optos devices, P200T, P200DTx, P200TE and P200TxE when used with Optos Suzuka image processing software. The system implements the necessary DICOM services to save acquired ophthalmic images to a network storage device. The system conforms to the DICOM standard to allow the sharing of medical information with other digital imaging systems.

Table 1 provides an overview of the network services that are supported by the OPTOS devices with OPTOS Suzuka Image Processing Software.

### Table 1: Network Services

| SOP Class | User Of Service (SCU) | Provider of Service (SCP) |
|---|---|---|
| **Transfer** | | |
| Grayscale Softcopy Presentation State Storage | Yes | No |
| Ophthalmic Photography 8-bit Image Storage | Yes | No |
| Ophthalmic Tomography Image Storage | Yes | No |
| Widefield Ophthalmic Photography Stereographic Projection Image Storage | Yes | No |
| Stereometric Relationship Storage | Yes | No |

Table 2 provides an overview of the Media Storage Application Profiles supported by the Software.

### Table 2: Media Services

| Media Storage Application Profile | Write Files (FSC or FSU) | Read Files (FSR) |
|---|---|---|
| * | No | No |

# 2 Table of Contents

# 3   Introduction

## 3.1   Revision History

**Table 3: Revision History**

| Revision | Date | Author | Notes |
|---|---|---|---|
| 001 | 19th April 2015 | Anilasha Varkey | First edition- DCS for P200TE |
| 002 | 1st December 2015 | Gavin Falconer | Second edition DCS for P200TE |
| 002 | 15th Feb 2016 | Gavin Falconer | Corrections to Second edition DCS for P200TE:<br>Table 54 and table 58 for OPT SOP instances;<br>Tables 59, 60 and 62 for GSPS SOP instances. |
| 003 | 17th May 2016 | Gavin Falconer | Third edition DCS for P200TE, with Suzuka release v1.0.1.<br>Added Private Ophthalmic Frame Location Functional Group Macro for OPT SOP Instances.<br>Corrections to VR for several OPT SOP instance tags. |
| 004 | 29th Sept 2016 | Gavin Falconer | Fourth edition DCS for P200TE with Suzuka release v1.1.0. |
| 005 | 8th November 2016 | Gavin Falconer | Added private tags for ProView sharpening. |
| 005 | 13th December 2016 | Anilasha Varkey | Added private tags for OCT scan metrics |
| 006 | 16th February 2017 | Anilasha Varkey | Bug 8601 fix- corrected the 'Ophthalmic Image Orientation' tag value for RNFL image<br>Bug 8606 fix- correct dicom tag number for ICC Profile. |
| 007 | 27th February 2017 | James Howat | Bug 8618 fix – correct dicom VRs for scan outcome labels. |
| 008 | 7th September 2017 | Steven Reid | Bug 8803 fix – correct scan type names. Align private tag definitions with Vantage. |
| 009 | 12th April 2018 | James Howat<br>Steven Reid | Bug 9252 fix – align General Equipment Manufacturer tag value with Vantage.<br>Added private tag for OCT fovea location and OCT segmentation outcomes.<br>Added private tag usages for General Projection. |

| 010 | 7th November 2018 | James Howat | Updated private tags for OCT fovea location, disc location and 3D cup and disc perimeter. Updated OPT Equipment values for P200TE. |
|-----|-------------------|-------------|-----------------------------------------------|
| 011 | 25th January 2019 | Michael Irvine James Howat | Added private tag for Optos Procedure Description Merged content for P200TxE Added Stereometric Relationship Storage SOP Class |
| 012 | 20th March 2019 | Michael Irvine | Added entries to Table 52 to support linking of ONH and derived RNFL images |
| 013 | 11th May 2020 | Gary Young | Added entries into Table 52 to support linking of OCT scans to predecessors Added entries into tables 61 and 71 to support follow up scans Added details of follow up data that is now being stored in the dicoms in section 4.2.1.3.1.1 Description and sequencing of activities |
| 014 | 17th July 2020 | Mike Irvine Steven Reid | Added Patient Comments entry into Table 18 Update unprojected SLO image private tag |
| 015 | 19th April 2021 | Steven Reid Colin Keillor Mike Irvine | Add Segmentation Fovea Detection Confidence and Outcome into Table 61 and Table 71 Updated Study Instance UID tags value and source details. Add Operator's Name entry into Table 20 Updated 4.2.1 and 4.4.1.2 to cover C-Store |
| 016 | 07th September 2021 | Colin Keillor | Added sections 4.2 and 4.4.1.4.1 to 4.4.1.4.1.3 detailing MWL support. |
| 017 | 20th December 2021 | Colin Keillor | Updated section 1 adding list of supported Optos devices. Correction of table numbers throughout document. |

## 3.2   Audience

This document is written for the people that need to understand how the OPTOS Device and Suzuka Image Processing Software will integrate into their healthcare facility.  This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product.

This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features.  However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

## 3.3    Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between the OPTOS Software and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard.  DICOM by itself does not guarantee interoperability.

The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality. This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information.  In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.

- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

## 3.4   Terms and Definitions

Informal definitions are provided for the following terms used in this Conformance Statement.  The DICOM Standard is the authoritative source for formal definitions of these terms.

**Abstract Syntax** – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

**Application Entity (AE)** – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages.  A single device may have multiple Application Entities.

**Application Entity Title** – the externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.

**Application Context** – the specification of the type of communication used between Application Entities.  Example: DICOM network protocol.

**Association** – a network communication channel set up between Application Entities.

**Attribute** – a unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

**Information Object Definition (IOD)** – the specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as:
- Mandatory (Type 1)
- Required but possibly empty (Type 2)
- Optional (Type 3)

There may be also be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

**Joint Photographic Experts Group (JPEG)** – a set of standardized image compression techniques, available for use by DICOM applications.

**Media Application Profile** – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

**Module** – a set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

**Negotiation** – first phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.

**Presentation Context** – the set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.

**Protocol Data Unit (PDU)** – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

**Security Profile** – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

**Service Class Provider (SCP)** – role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

**Service Class User (SCU)** – role of an Application Entity that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

**Service/Object Pair (SOP) Class** – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

**Service/Object Pair (SOP) Instance** – an information object; a specific occurrence of information exchanged in a SOP Class. Examples: a specific x-ray image.

**Tag** – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

**Transfer Syntax** – the encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), little-endian explicit value representation.

**Unique Identifier (UID)** – a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

**Value Representation (VR)** – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

**C-ECHO** - DICOM service used to verify end-to-end communications with a peer DICOM-service-user

**C-STORE** - DICOM service for storing objects, e.g. images

**Modality Worklist** - DICOM service to inform the modality of scheduled examinations

## 3.5   Basics of DICOM Communication

This section describes terminology used in this Conformance Statement for the non-specialist.

The key terms used in the Conformance Statement are highlighted in italics below.  This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network "handshake". One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).

DICOM specifies a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted Transfer Syntaxes.  The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.

 For each Presentation Context, the Association Negotiation also allows the devices to agree on Roles – which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server).  Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (PDU) size, security information, and network service options (called Extended Negotiation information). The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers.  Each exchangeable unit of data is formatted by the sender in accordance with the appropriate Information Object Definition, and sent using the negotiated Transfer Syntax.  There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases.  Each transfer is explicitly acknowledged by the receiver with a Response Status indicating success, failure, or that query or retrieve operations are still in process.

## 3.6   Abbreviations

| | |
|---|---|
| AE | Application Entity |
| AET | Application Entity Title |
| CD-R | Compact Disk Recordable |
| DICOM | Digital Imaging and Communications in Medicine |
| FSC | File-Set Creator |
| FSU | File-Set Updater |
| FSR | File-Set Reader |
| IHE | Integrating the Healthcare Enterprise |
| IOD | Information Object Definition |
| IS | Information System (HIS, RIS, PACS within hospital) |
| IPv4 | Internet Protocol version 4 |
| IPv6 | Internet Protocol version 6 |
| ISO | International Organization for Standards |
| JPEG | Joint Photographic Experts Group |
| LUT | Look-up Table |
| MWL | Modality Worklist |

OP          Ophthalmic Photography
OSI         Open Systems Interconnection
PACS        Picture Archiving and Communication System
PDU         Protocol Data Unit
SC          Secondary Capture
SCP         Service Class Provider
SCU         Service Class User
SOP         Service-Object Pair
TCP/IP      Transmission Control Protocol/Internet Protocol
UID         Unique Identifier
VR          Value Representation
WSD         Workstation

## 3.7   References

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

# 4  Networking

The supported OPTOS devices with OPTOS Suzuka Image Processing Software allows for the following DICOM functionality:

- Exporting DICOM images to a DICOM SCP

## 4.1  Implementation Model

### 4.1.1  Application Data Flow Diagram

This DICOM Conformance statement specifies the behavior and functionality of the OPTOS Suzuka Image Processing Software.
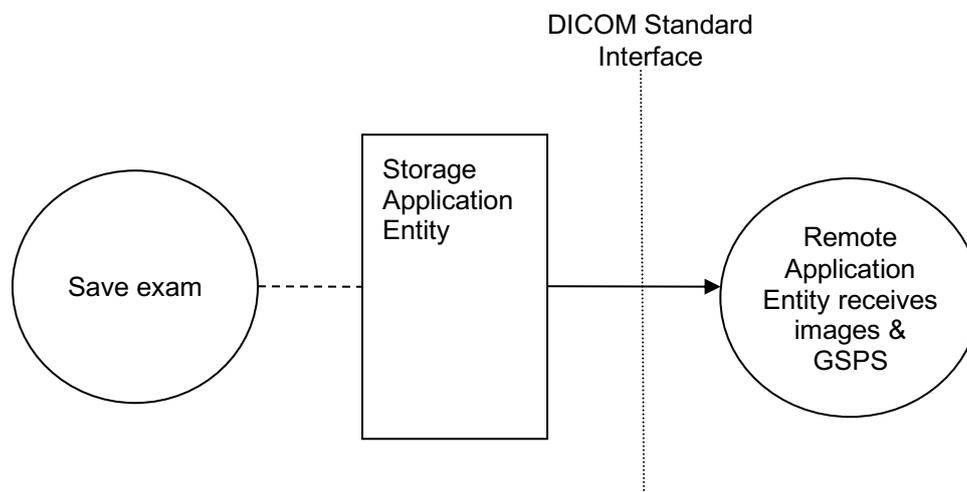


The Storage Application Entity sends images, Presentation States and, where applicable, Stereometric Relationship objects, to a remote AE. It is associated with the local real-world activity "Save exam". "Save exam" is performed automatically when a scan head operator completes a patient exam.

The images associated with the real-world activity "Save exam" may include one or more:

- Widefield Ophthalmic Photography images from a Scanning Laser Ophthalmoscope (SLO). A Stereographic Projection transform will have been applied to these images.
- Optical Coherence Tomography images, where each image comprises a collection of OCT image frames, accompanied by an SLO index image. (An SLO index image will not have been subject to Stereographic Projection).

### 4.1.2  Functional Definition of Storage Application Entity

The Storage Application Entity encodes image content acquired by an imaging device into appropriate DICOM SOP instances. The application then uses the DICOM protocol to transfer the data across the network to the remote SCP.

### 4.1.3 Sequencing of Real-World Activities

Not applicable

## 4.2 Implementation Model – Modality Worklist

### 4.2.1 Application Data Flow Diagram

The worklist is queried by the AE and supplies the SCU (Optos device and Suzuka software) with the scheduled tasks that have to be performed on the modality. Optos device and Suzuka software supports the worklist service in the role of a SCU.
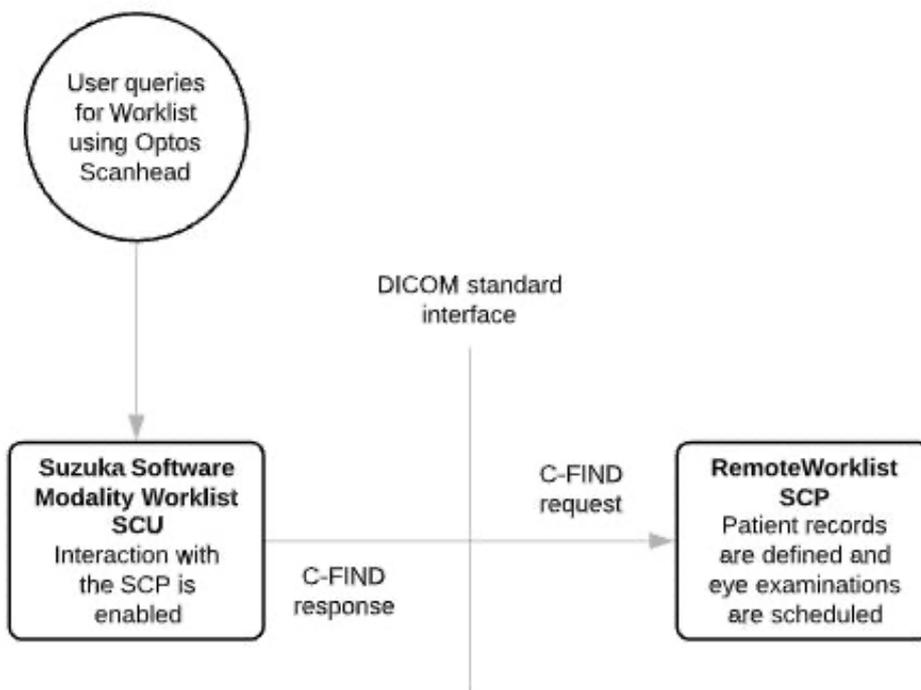


### 4.2.2 Functional Definitions of Modality Work List Application Entity

The modality worklist SCU requests the worklist SCP to perform a match to the keys specified in the C-FIND DIMSE service. The worklist SCP responds to the C-FIND query and sends scheduled imaging service requests and patient demographic information from the information system to the modality. Suzuka software then sends the result from the C-FIND service to the Optos device to initiate the examination.

### 4.2.3 Sequencing of Real-World Activities

In order to perform a worklist query, the user must search for the scheduled procedure using the search criteria (patient based query or broad query) on the Optos device. On receiving a call to the patient search API endpoint, Suzuka software sends a C-FIND query with the search keys to the configured SCP. The matching results are then received by the Optos Scanhead Device via the Suzuka software. The displayed results are based on the search keys entered in the query fields. After the task is completed, the user can perform a new query.

## 4.3    Implementation Model - Storage

### 4.3.1  Functional Definitions of Storage Application Entities

Assuming the system is correctly configured Suzuka worker application will create an association with the designated Storage SCP and transfer the DICOM image files.  This is performed as a transparent process from the user's perspective; there is no user feedback to indicate that the transfer has occurred or any other status regarding the transfer.  If a problem arises then the detail of the error is logged.

### 4.3.2  Sequencing of Real World Activities

The Suzuka software implements only the Storage AE, so real-world activities are limited to the storing of images.  There is, therefore, no scope for sequencing or interaction of separate AE's.

## 4.4    Application Entitiy Specifications

### 4.4.1  Storage Application Entity Specification

The software can be configured to store DICOM images to a PACS / storage system via DIMSE C-STORE.

#### 4.4.1.1  SOP Classes

This Application Entity provides Standard or Standard Extended Conformance to the following DICOM SOP Classes:

**Table 4: SOP Classes for AE Storage**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Ophthalmic Photography 8 Bit Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | Yes | No |
| Widefield Ophthalmic Photography Stereographic Projection Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.77.1.5.5 | Yes | No |
| Ophthalmic Tomography Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.77.1.5.4 | Yes | No |
| Grayscale Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.1 | Yes | No |
| Stereometric Relationship Storage SOP Class | 1.2.840.10008.5.1.4.1.1.77.1.5.3 | Yes | No |

### 4.4.1.2 Association Policies

#### 4.4.1.2.1    General

The DICOM standard application context name for DICOM 3.0 is used:

**Table 5: DICOM application context for AE Storage**

| Application Context Name | 1.2.840.10008.3.1.1.1 |
|---|---|

The software requests a maximum PDU size of 16 Kbytes (16384 bytes).

The software does not support extended negotiations.

The only supported network protocol is TCP/IP. The underlying Operating System provides the TCP/IP stack.

The Application Entity Title, the port number, and the host name or net address get defined in the Image Processing service configuration file.

#### 4.4.1.2.2    Number of Associations

The AE will attempt only one association establishment at a time.

**Table 6: Number of Associations Initiated for AE Storage**

| Maximum number of simultaneous Associations | 1 |
|---|---|

#### 4.4.1.2.3    Asynchronous Nature

The AE does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 7: Asynchronous Nature as an SCU for AE Storage**

| Maximum number of outstanding asynchronous transactions | 1 |
|---|---|

#### 4.4.1.2.4    Implementation Identifying Information

The implementation information for this Application Entity is:

**Table 8: DICOM Implementation Class and Version for AE Storage**

| Implementation Class UID | 1.2.276.0.7230010.3.0.3.6.2 |
|---|---|
| Implementation Version Name | OFFIS_DCMTK_362 |

### 4.4.1.3 Association Initiation Policies

The software will initiate an association as an outcome of the following real-wold activity:

- Save exam initiated by the operator for acquired images

#### 4.4.1.3.1    Activity – Save exam

#### 4.4.1.3.1.1 Description and sequencing of activities

When a scan head operator completes a patient exam, the Storage Application Entity is automatically invoked to generate appropriate SOP instances and transfer the acquired images to a DICOM storage SCP.

Where an exam includes Widefield Ophthalmic Photography images, each image will be encoded as either a Widefield Ophthalmic Photography Stereographic Projection Image Storage SOP instance, or as an Ophthalmic Photography 8-Bit Image Storage SOP instance, depending on the value of the "Support Widefield Ophthalmic Photography Stereographic Projection SOP Class" configuration setting for the application.

In addition, where an exam includes Widefield Ophthalmic Photography images, a Grayscale Softcopy Presentation State SOP instance will be generated for the exam, containing display settings for each of the Widefield Ophthalmic Photography images.

Where an exam includes Optical Coherence Tomography images, each such image will result in an Ophthalmic Photography 8-bit Image Storage SOP instance for the SLO index image, and an Optical Coherence Tomography Image Storage SOP instance for the OCT frames.

Where an exam includes any pairs of either Widefield Ophthalmic Photography Stereographic Projection Image Storage SOP or Ophthalmic Photography 8-Bit Image Storage SOP instances, identified by the scan head as being two parts of a stereometric pair, a Stereometric Relationship Storage SOP instance will be generated, recording the relationship between all pairs.

When an exam includes information of a previous exam, then the temporal predecessor value will be recorded.

When an exam provides scan information relating to a previous exam then the information will be recorded in the OCT Module.

### 4.4.1.3.1.2  Presentation Contexts

The Storage Application Entity exports files within which the Presentation Contexts are listed  in

Table 9.  The AE has no fall-back implementation in the event that the Presentation Contexts are rejected by the SCP.

**Table 9: Proposed Presentation Contexts for AE Storage**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Ext. Neg.** |
| **Name** | **UID** | **Name List** | **UID** | | |
| Ophthalmic Photography 8-Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 SV1) | 1.2.840.10008.1.2.4.70 | SCU | None |
| Widefield Ophthalmic Photography Stereographic Projection Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.5 | JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 SV1) | 1.2.840.10008.1.2.4.70 | SCU | None |
| Ophthalmic Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.4 | JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 SV1) | 1.2.840.10008.1.2.4.70 | SCU | None |
| Grayscale Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| Stereometric Relationship Storage SOP Class | 1.2.840.10008.5.1.4.1.1.77.1.5.3 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |

### 4.4.1.3.1.3  SOP Specific Conformance for Storage SOP Classes

All Image & Presentation State Storage SOP Classes supported by the Storage AE exhibit the same behavior, except where stated, and are described together in this section.

The behavior of Storage AE when encountering status codes in a C-STORE response is summarized in the Table below:

**Table 10: Storage C-STORE Response Status Handling Behaviour**

| Service Status | Further Meaning | Error Code | Behaviour |
|---|---|---|---|
| Success | Success | 0000 | The SCP has successfully stored the SOP Instance. If all SOP Instances in a send job have status success then the job is marked as complete. |
| * | * | Any other response | A failure is logged |

A failed send job can be restarted by user interaction.

The contents of Ophthalmic Photography 8-bit Image Storage SOP Instances created by the OPTOS Suzuka software conform to the DICOM Ophthalmic Photography 8-bit Image IOD and are described in 7.1.1.1.

The contents of Widefield Ophthalmic Photography Stereographic Projection Image Storage SOP Instances created by the OPTOS Suzuka software conform to the DICOM Widefield Ophthalmic Photography Stereographic Projection Image IOD and are described in 7.1.1.2.

The contents of Ophthalmic Tomography Image Storage SOP Instances created by the OPTOS Suzuka software conform to the DICOM Ophthalmic Tomography Image IOD and are described in 7.1.1.3.

The contents of Grayscale Softcopy Presentation State Storage SOP Instances created by the OPTOS Suzuka software conform to the DICOM Grayscale Softcopy Presentation State IOD and are described in 7.1.1.4.

The contents of Stereometric Relationship Storage SOP Instances created by the OPTOS Suzuka software conform to the DICOM Stereometric Relationship IOD and are described in 7.1.1.4 .

### 4.4.1.4  Association Acceptance Policy

No Associations are accepted. This AE is SCU.

#### 4.4.1.4.1    Real-World Activity – for Modality Worklist

Suzuka software initiates an association for DICOM C-FIND service.

#### 4.4.1.4.1.1  Associated Real-World Activity – for Modality Worklist

The user performs a modality worklist query from the Optos device which is sent to the SCP via the Suzuka software. When Optos device queries for new worklist entries, Suzuka software opens an association to the Modality Worklist SCP. After the association has been
established, a C-Find request with possible matching values is sent to the SCP. The
provider then sends the matching worklist entries with C-Find responses to the Worklist SCU.

#### 4.4.1.4.1.2  Proposed Presentation Contexts – for Modality Worklist

The presentation contexts that are proposed by Optos device and Suzuka software for the Modality Worklist C-Find operations are specified as follows:

**Table 11: Presentation Contexts for Modality Worklist**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Ext. Neg.** |
| **Name** | **UID** | **Name List** | **UID** | | |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 | Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian | 1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2 | SCU | None |
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian | 1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2 | SCU | None |
| Patient Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Explicit VR Little Endian Implicit VR Little Endian Explicit VR Big Endian | 1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2 | SCU | None |

#### 4.4.1.4.1.3  SOP Specific Conformance for Modality Worklist

The following Module descriptions contain the attributes, which are present in a C-FIND request messages sent by the Suzuka software to a remote AE. The descriptions also specify the attributes that are copied into the images.
Unexpected attributes returned in a C-FIND response are ignored.

The below tables should be read as follows:
Attribute Name: Attributes supported to build a Modality Worklist request.
Tag: DICOM tag for this attribute.
Required for MWL: These attributes are required for Optos devices and Suzuka software to be configured with Modality Worklist. { Yes=required; No=Not required }
Mapped into The Image: Whether this data is mapped into subsequently acquired images
  Notes: Clarification of this implementation's use/treatment of this attribute

## SOP Common Module

**Table 12: SOP Common Module Attributes**

| Attribute Name | Tag | Required for MWL | Mapped into the image | Notes |
|---|---|---|---|---|
| Specific Character Set | (0008,0005) | Yes | Yes | |

## Patient List Query

**Table 13: Patient List Query Attributes**

| Attribute Name | Tag | Required for MWL | Mapped into the image | Notes |
|---|---|---|---|---|
| Patient ID | (0010,0020) | No | Yes | Wild card matching is implemented for leading and trailing characters. Patient ID is displayed on the optos device screen |
| Patient Name | (0010,0010) | No | Yes | Matching is supported as follows: either no Patient's Name is supplied; the patient's last (family) name specified on the scanner's screen is supplied, or the Patient's first name for matching; this is user defined. Wild card matching is implemented for leading and trailing characters. Patient name is displayed on the optos device screen |
| Other Patient ID's | (0010,1000) | No | Yes | |
| Issuer of Patient ID | (0010,0021) | No | | |
| Patient's Sex | (0010,0040) | Yes | Yes | Patient's Sex is displayed on the optos device screen |
| Patient's Birth Date | (0010,0030) | Yes | Yes | Patient's Date of birth is displayed on the optos device screen |

## Study Query
## All attributes as patient query, plus :

**Table 14:  Study Query Attributes**

| Attribute Name | Tag | Required for MWL | Mapped into the image | Notes |
|---|---|---|---|---|
| Study Instance UID | (0020,000D) | No | | Unique identifier for the Study. |
| Modalities in Study | (0008,0061) | No | | All of the distinct values used for Modality (0008,0060) in the Series of the Study. |
| Study ID | (0020,0010) | No | | User or equipment generated |

| Attribute Name | Tag | Required for MWL | Mapped into the image | Notes |
|---|---|---|---|---|
| | | | | Study identifier. |
| Accession Number | (0008,0050) | No | | A RIS generated number that identifies the order of the study. |
| Study Date | (0008,0020) | No | | Date the Study started. |
| Study Time | (0008,0030) | No | | Time the Study started. |
| Study Description | (0008,1030) | No | | Institution-generated description or classification of the Study (component) performed. |
| Number of Study Related Series | (0020,1206) | No | | The number of series that match the Study level Query/Retrieve search criteria. |
| Number of Study Related Instances | (0020,1208) | No | | The number of Compsite Object Instances that match the Study level Query/Retrieve search criteria. |

## Series Query

## All attributes as patient query, plus :

**Table 15: Series Query Attributes**

| Attribute Name | Tag | Required for MWL | Mapped into the image | Notes |
|---|---|---|---|---|
| Study Instance UID | (0020,000D) | Yes | | Unique identifier for the Study. |
| Series Instance UID | (0020,000E) | No | | Unique identifier for the Series. |
| Series Number | (0020,0011) | No | | A number that identifies the Series. |
| Series Description | (0008,103E) | No | | Description of the Series. |
| Modality | (0008,0060) | No | | Type of equipment that originally acquired the data used to create the images in this series. |
| Series Date | (0008,0021) | No | | Date the Series started. |
| Series Time | (0008,0031) | No | | Time the Series started. |
| Number of Series Related Instances | (0020,1209) | No | | The number of Composite Object Instances in a Series that match the Series level Query/Retrieve search criteria. |

## Work List Query

**Table 16: Work List Query Attributes**

| Attribute Name | Tag | Required for MWL | Mapped into the image | Notes |
|---|---|---|---|---|
| Patient ID | (0010,0020) | No | Yes | Wild card matching is implemented for leading and trailing characters. Patient ID is displayed on the optos device screen |

| Patient Name | (0010,0010) | No | Yes | Matching is supported as follows: either no Patient's Name is supplied; the patient's last (family) name specified on the scanner's screen is supplied, or the Patient's first name for matching; this is user defined. Wild card matching is implemented for leading and trailing characters. Patient name is displayed on the optos device screen |
|---|---|---|---|---|
| Other Patient ID's | (0010,1000) | No | Yes | |
| Issuer of Patient ID | (0010,0021) | No | | |
| Patient's Sex | (0010,0040) | No | Yes | Patient's Sex is displayed on the optos device screen |
| Patient Weight | (0010,1030) | No | | Weight of the Patient, in kilograms. |
| Patient's Birth Date | (0010,0030) | No | Yes | Patient's Date of birth is displayed on the optos device screen |
| Medical Alerts | (0010,2000) | No | | Conditions to which medical staff should be alerted. |
| Pregnancy Status | (0010,21C0) | No | | Describes pregnancy state of Patient. |
| Allergies | (0010,2110) | No | | Description of prior reaction to contrast agents, or other patient allergies or adverse reactions. |
| Patient Comments | (0010,4000) | No | | User-defined additional information about the Patient. |
| Special Needs | (0038,0050) | No | | Medical and Social needs. |
| Patient State | (0038,0500) | No | | Description of Patient state. |
| Current Patient Location | (0038,0300) | No | | Describes the current known location of the Patient. |
| Institution Name | (0008,0080) | No | | Institution where the equipment that produced the composite instances is located. |
| Admission ID | (0038,0010) | No | | Visit and Admission are interchangeable here. |
| Accession Number | (0008,0050) | No | | A RIS generated number that identifies the order of the study. |
| Referring Physician's Name | (0008,0090) | No | Yes | Referring Physician's Name is displayed on the optos device screen |
| Admitting Diagnoses | (0008,1080) | No | | Description of the admitting |

| Description | | | | diagnosis (diagnoses). |
|---|---|---|---|---|
| Requesting Physician | (0032,1032) | No | | Name of the Physician who requested the Imaging Service Request. |
| Study Instance UID | (0020,000D) | Yes | | Unique identifier for the Study. |
| Study Description | (0008,1030) | No | | Institution-generated description or classification of the Study (component) performed. |
| Study ID | (0020,0010) | No | | User or equipment generated Study identifier. |
| Reason for the Requested Procedure | (0040,1002) | No | | Reason for requesting this procedure. |
| Study Date | (0008,0020) | No | | Date the Study started. |
| Study Time | (0008,0030) | No | | Time the Study started. |
| Requested Procedure ID | (0040,1001) | No | | |
| Requested Procedure Description | (0032,1060) | No | | |
| Requested Procedure Priority | (0040,1003) | No | | Requested Procedure Type urgency. |
| Requested Procedure Code Sequence | (0032,1064) | No | | |
| Referenced Study Sequence | (0008,1110) | No | | |
| Procedure Code Sequence | (0008,1032) | No | | A Sequence that conveys the type of procedure perfomed. |

## Scheduled Procedure Step Module (for Worklist Query)

**Table 17: Scheduled Procedure Step Module Attributes**

| Attribute Name | Tag | Required for MWL | Mapped into the image | Notes |
|---|---|---|---|---|
| Scheduled Procedure Step Sequence | (0040,0100) | No | | |
| > Scheduled Station AE Title | (0040,0001) | No | | Suzuka software supports Broad query using scheduled AE Title |
| > Scheduled Station Name | (0040,0010) | No | | Not used |
| > Scheduled Procedure Step Start Date | (0040,0002) | No | | Suzuka software support Broad query using procedure start date |
| > Scheduled Procedure Step Start Time | (0040,0003) | No | | Not used |
| > Modality | (0008,0060) | No | Yes | Matching is supported as follows: either no Modality is supplied (universal matching), or the scanner's Modality is supplied |

| | | | | for matching; this is user defined. |
|---|---|---|---|---|
| > Scheduled Performing Physician's Name | (0040,0006) | No | | Not used |
| > Scheduled Procedure Step Description | (0040,0007) | No | | Not used |
| > Scheduled Protocol Code Sequence | (0040,0008) | No | | Not used |
| > Scheduled Procedure Step Location | (0040,0011) | No | | Not used |
| > Scheduled Procedure Step ID | (0040,0009) | No | | Not used |
| > Requested Contrast Agent | (0032,1070) | No | | Not used |
| > Pre-Medication | (0040,0012) | No | | Not used |
| > Anitomical Orientation Type | (0010,2210) | No | | Not used |

## 4.5   Network interfaces

### 4.5.1  Physical Network Interface

The software operates in a Microsoft Windows environment, and as such is not associated with any specific physical networking hardware.

The software uses the Windows TCP/IP stack from the host machine.

### 4.5.2  Additional Protocols

The software does not make use of any additional protocols.

### 4.5.3  IPv4 and IPv6 Support

The software supports IPv4.  The software does not support IPv6.

Where configuration permits and IP address to be specified, that IP address must be specified as an IPv4 address.

## 4.6   Configuration

### 4.6.1.1  Application Entity Title/Presentation Address Mapping

The local AE title is configurable through the configuration screen.

#### 4.6.1.1.1    Local Application Entity Titles

There is a configuration Screen for AE Titles, port numbers, and addresses. There are no configured defaults. The operator must configure values when enabling this feature.

**Table 18: AE Title Configuration Table**

| Application Entity | Default AE Title | Default TCP/IP Port |
|---|---|---|
| Storage | No Default | No Default |

### 4.6.1.2  Remote Aplication Entity Title / Presentation Address Mapping

The AE Title, host names and port numbers of remote applications are configured using the application configuration utility.

#### 4.6.1.2.1    Storage

The application configuration utility must be used to set the AE Titles, port-numbers, host-names and capabilities for the remote Storage SCPs. Associations will only be accepted from known AE Titles and associations from unknown AE Titles will be rejected (an AE Title is known if it can be selected within the Service/Installation Tool). Only a single remote Storage SCP can be defined.

### 4.6.1.3  Parameters

The following configuration parameters affect DICOM communication for the product:

**Table 19: Configuration Parameters**

| Parameter | Configurable (Yes/No) | Default Value |
|---|---|---|
| **Storage Parameters** | | |
| Support Widefield Ophthalmic Photography Stereographic Projection SOP Class | Yes | True |
| Character encoding for Image Storage SOP instances | Yes | ISO IR 192 |
| Apply Lossless JPEG compression to images | Yes | True |
| Network name / IP address of the Store SCP (ImageProcesing_DicomServerHost) | Yes | localhost |
| TCP/IP port number for the Store SCP (ImageProcessing_DicomServerPort) | Yes | 1100 |
| Number of times to attempt a DIMSE C-STORE request. (ImageProcessingQueue_WorkerMaxNoOfHighRiskJob Assignments) | Yes | 16 attempts |

| | | |
|---|---|---|
| Calling AP title. (ImageProcessing_DicomClientAet) | Yes | NILAE |
| Called AP title. (ImageProcessing_DicomServerAet) | Yes | NILAE |

# 5   Support for Extended Character Sets

## 5.1   Character sets in use

All Application Entities for the product support the following character sets:

- ISO IR 192 (UTF-8 encoding)
- ISO IR 100 (ISO 8859-1 : 1987 Latin alphabet No. 1 supplementary set)

### 5.1.1  Character set configuration

The selection of character set for DICOM SOP instances is a user configurable setting within the software application. All DICOM SOP instances generated will use the same character set, as configured for the application.

By default, the application will use the ISO IR 192 character set.

# 6   Security

## 6.1   Conformance

The product does not claim conformance with the Secure Use Profiles listed in Part 15 of the DICOM specifications.

This product assumes that it operates within a secure environment.

# 7    Annexes

## 7.1    IOD Contents

### 7.1.1   Created SOP Instances

Table 20 specifies the attributes of an Ophthalmic Photograpy 8-bit Image transmitted by OPTOS devices using the Suzuka storage application.

Table 21 specifies the attributes of a Widefield Ophthalmic Photography Stereographic Projection Image transmitted by OPTOS devices using the Suzuka storage application.

Table 22 specifies the attributes of an Ophthalmic Tomography Image transmitted by OPTOS devices using the Suzuka storage application.

Table 24 specifies the attributes of a Grayscale Softcopy Presentation State transmitted by OPTOS devices using the Suzuka storage application.

Abbreviations used for the Usage field in the tables are:

| | |
|---|---|
| **VNAP** | Value Not Always Present (attribute sent zero length if no value is present) |
| **ANAP** | Attribute Not Always Present |
| **ALWAYS** | Always present with a value |
| **EMPTY** | Attribute is sent without a value |

Abbreviations used for the source of the data values are:

| | |
|---|---|
| **USER** | the attribute value source is from User input |
| **AUTO** | the attribute value is generated automatically |
| **CONFIG** | the attribute value source is a configurable parameter |

Note

All date (DA) and time (TM) values are encoded in the local configured calendar and time. DateTime (DT) values will include an explicit timezone offset from UTC.

### 7.1.1.1 Ophthalmic Photography 8-Bit Image IOD

**Table 20: IOD of Created Ophthalmic Photography 8-Bit Image Instances**

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Patient | Patient | Table 26: Patient Module of Created SOP Instances | ALWAYS |
| Study | General Study | Table 27 | ALWAYS |
| Series | General Series | Table 28 | ALWAYS |
|  | Ophthalmic Photography Series | Table 36 | ALWAYS |
| Frame Of Reference | Frame Of Reference – *see Note 1* | Table 29 | ALWAYS |
|  | Synchronization | Table 30 | ALWAYS |
| Equipment | General Equipment | Table 31 | ALWAYS |
| Image | General Image | Table 37 | ALWAYS |
|  | Image Pixel | Table 38 | ALWAYS |
|  | Enhanced Contrast/Bolus | Table 33 | Only present if contrast was administered |
|  | Cine | N/A | Not used |
|  | Multi-frame | Table 39 | ALWAYS |
|  | Ophthalmic Photography Image | Table 40 | ALWAYS |
|  | Ocular Region Imaged | Table 34 | ALWAYS |
|  | Ophthalmic Photography Acquisition Parameters | Table 41 | ALWAYS |
|  | Ophthalmic Photographic Parameters | Table 42 | ALWAYS |
|  | SOP Common | Table 35 | ALWAYS |
|  | Private Ophthalmic Photography Image – *See Note 1* | Table 43 | ALWAYS |

*Note 1* - Ophthalmic Photography 8-Bit Image SOP Instances conform to a Standard Extended SOP Class definition, with the addition of Frame of Reference and Private Ophthalmic Photography Image module attributes.

### 7.1.1.2 Widefield Ophthalmic Photography Stereographic Projection IOD

**Table 21: IOD of Created Widefield Ophthalmic Photography SP Image Instances**

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Patient | Patient | Table 26 | ALWAYS |
| Study | General Study | Table 27 | ALWAYS |
| Series | General Series | Table 28 | ALWAYS |
|  | Ophthalmic Photography Series | Table 44 | ALWAYS |

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Frame Of Reference | Frame Of Reference | Table 29 | ALWAYS |
| | Synchronization | Table 30 | ALWAYS |
| Equipment | General Equipment | Table 31 | ALWAYS |
| | Enhanced General Equipment | Table 32 | ALWAYS |
| Image | General Image | Table 45 | ALWAYS |
| | Image Pixel | Table 46 | ALWAYS |
| | Enhanced Contrast/Bolus | Table 33 | Only present if contrast was administered |
| | Cine | N/A | Not used |
| | Multi-frame | Table 47 | ALWAYS |
| | Ophthalmic Photography Image | Table 48 | ALWAYS |
| | Widefield Ophthalmic Photography Stereographic Projection | | ALWAYS |
| | Widefield Ophthalmic Photography Quality Rating | N/A | Not used |
| | Ocular Region Imaged | Table 34 | ALWAYS |
| | Ophthalmic Photography Acquisition Parameters | Table 50 | ALWAYS |
| | Ophthalmic Photographic Parameters | Table 51 | ALWAYS |
| | ICC Profile | Table 52 | Only if Photometric Interpretation (0028,0004) is not MONOCHROME2 |
| | SOP Common | Table 35 | ALWAYS |
| | Frame Extraction | N/A | Not used |
| | Private Ophthalmic Photography Image – *see Note 2* | Table 53 | ALWAYS |

*Note 2* – Widefield Ophthalmic Photography Stereographic Projection Image SOP Instances conform to a Standard Extended SOP Class definition, with the addition of Private Ophthalmic Photography Image module attributes.

### 7.1.1.3 Ophthalmic Tomography Image IOD

**Table 22: IOD of Created Ophthalmic Tomography Image Instances**

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Patient | Patient | Table 26 | ALWAYS |
| Study | General Study | Table 27 | ALWAYS |
| Series | General Series | Table 28 | ALWAYS |
| | Ophthalmic Tomography Series | Table 54 | ALWAYS |

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Frame Of Reference | Frame Of Reference | Table 29 | ALWAYS |
| | Synchronization | Table 30 | ALWAYS |
| Equipment | General Equipment | Table 31 | ALWAYS |
| | Enhanced General Equipment | Table 32 | ALWAYS |
| Image | General Image – *see Note 3* | Table 55 | ALWAYS |
| | Image Pixel | Table 56 | ALWAYS |
| | Enhanced Contrast/Bolus | N/A | Not used |
| | Multi-frame Functional Groups | Table 59 | ALWAYS |
| | Multi-frame Dimension | Table 57 | ALWAYS |
| | Acquisition Context | **Error! Reference source not found.** | ALWAYS |
| | Cardiac Synchronization | N/A | Not used |
| | Ophthalmic Tomography Image | Table 66 | ALWAYS |
| | Ophthalmic Tomography Acquisition Parameters | Table 67 | ALWAYS |
| | Ophthalmic Tomography Parameters | Table 68 | ALWAYS |
| | Ocular Region Imaged | Table 34 | ALWAYS |
| | SOP Common | Table 35 | ALWAYS |
| | Private Ophthalmic Tomography Image – *See Note 3* | Table 69 | ALWAYS |

*Note 3* - Ophthalmic Tomography Image SOP Instances conform to a Standard Extended SOP Class definition, with the addition of Private Ophthalmic Frame Location Functional Group Macro and Private Ophthalmic Tomography Image module attributes.

Table 23 below specifies the use of the Functional Group macros included in the Multi-Frame Functional Groups module for the Ophthalmic Tomography Image IOD.

**Table 23: Functional Group Macros Included in Ophthalmic Tomography Instances**

| Functional Group Macro | Reference | Presence of Macro |
|---|---|---|
| Pixel Measures | Table 61 | ALWAYS |
| Frame Content | Table 63 | ALWAYS |
| Plane Position (Patient) | N/A | Not used |
| Plane Orientation (Patient) | N/A | Not used |
| Referenced Image | Table 60 | ALWAYS |
| Derivation Image | N/A | Not used |
| Frame Anatomy | Table 62 | ALWAYS |
| Cardiac Synchronization | N/A | Not used |

| Contrast/Bolus Usage | N/A | Not used |
| Ophthalmic Frame Location | Table 64 | ALWAYS |

### 7.1.1.4 Grayscale Softcopy Presentation State IOD

**Table 24: IOD of Created Grayscale Softcopy Presentation State Instances**

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Patient | Patient | Table 26 | ALWAYS |
| Study | General Study | Table 27 | ALWAYS |
| Series | General Series | Table 28 | ALWAYS |
|  | Presentation Series | Table 70 | ALWAYS |
| Equipment | General Equipment | Table 31 | ALWAYS |
| Presentation State | Presentation State Identification | Table 71 | ALWAYS |
|  | Presentation State Relationship | Table 72 | ALWAYS |
|  | Displayed Area | Table 73 | ALWAYS |
|  | Graphic Annotation | Table 74 | Only if Graphic Annotations are present |
|  | Graphic Layer |  | Only if Graphic Annotations are present |
|  | Softcopy Presentation State LUT | Table 76 | ALWAYS |
|  | SOP Common | Table 35 | ALWAYS |

#### 7.1.1.5 Stereometric Relationship IOD

**Table 25: IOD of Created Stereometric Relationship Storage Instances**

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Patient | Patient | Table 26 | ALWAYS |
| Study | General Study | Table 27 | ALWAYS |
| Series | General Series | Table 28 | ALWAYS |
| | Stereometric Series | Table 77 | ALWAYS |
| Equipment | General Equipment | Table 31 | ALWAYS |
| Stereometric Relationship | Stereometric Relationship | Table 78 | ALWAYS |
| | SOP Common | Table 35 | ALWAYS |

### 7.1.1.6 Common Modules

**Table 26: Patient Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Patient's Name | (0010,0010) | PN | Values supplied via User Input. Values will be a single group of 5 components (some possibly empty). Maximum 64 characters. | ALWAYS | USER |
| Patient ID | (0010,0020) | LO | Value supplied via User Input. Maximum 64 characters. | ALWAYS | USER |
| Patient's Birth Date | (0010,0030) | DA | From User Input. | ALWAYS | USER |
| Patient's Sex | (0010,0040) | CS | From User Input. | ALWAYS | USER |
| Patient Comments | (0010,4000) | LT | From User Input | ANAP | USER |

**Table 27: General Study Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Study Instance UID | (0020,000D) | UI | Generated by device if not supplied by user. | ALWAYS | AUTO/ USER |
| Study Date | (0008,0020) | DA | Generated by device. <yyyymmdd> | ALWAYS | AUTO |
| Study Time | (0008,0030) | TM | Generated by device. <hhmmss.fff> | ALWAYS | AUTO |
| Referring Physician's Name | (0008,0090) | PN | Values supplied via User Input. Values will be a single group of 5 components (some possibly empty). Maximum 64 characters. | VNAP | USER |
| Study ID | (0020,0010) | SH | Zero Length | EMPTY | AUTO |
| Accession Number | (0008,0050) | SH | From User Input. | VNAP | USER |
| Study Description | (0008,1030) | LO | "Generic Eye Procedure 200 R" | ALWAYS | AUTO |

**Table 28: General Series Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Modality | (0008,0060) | CS | "OP", "OPT" or "PR" depending upon the series type. | ALWAYS | AUTO |
| Series Instance UID | (0020,000E) | UI | Generated by the device. | ALWAYS | AUTO |

| Series Number | (0020,0011) | IS | Value generated by the device if Modality is OP or OPT. Value not present if Modality is PR. | VNAP | AUTO |
| Series Description | (0008,103E) | LO | Generated by the device, e.g. "RG OptomapPlus". Maximum 64 chars. | ALWAYS | AUTO |
| Operator's Name | (0008,1070) | PN | Name(s) of the operator(s) supporting the series | VNAP | AUTO |
| Body Part Examined | (0018,0015) | CS | If Modality is OP or OPT, value is "EYE". Value not present if Modality is PR. | VNAP | AUTO |

**Table 29: Frame of Reference Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Frame Of Reference UID | (0020,0052) | UI | UID value generated by device. All images having a common Study Instance UID will share a common Frame of Reference UID. | ALWAYS | AUTO |
| Position Reference Indicator | (0020,1040) | LO | Generated from user input. "CORNEAL_VERTEX_L" or "CORNEAL_VERTEX_R" | ALWAYS | USER |

**Table 30: Synchronisation Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Synchronization Trigger | (0018,106A) | CS | "NO TRIGGER" | ALWAYS | AUTO |
| Acquisition Time Synchronized | (0018,1800) | CS | "N" | ALWAYS | AUTO |
| Synchronization Frame Of Reference UID | (0020,0200) | UI | UID value generated by device. All images having a common Study Instance UID will share a common Synchronization Frame of Reference UID. | ALWAYS | AUTO |

**Table 31: General Equipment Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Manufacturer | (0008,0070) | LO | "OPTOS" | ALWAYS | AUTO |
| Institution Name | (0008,0080) | LO | User input. Maximum 64 characters. | ALWAYS | USER |
| Station Name | (0008,1010) | SH | Generated by device, based on Device Serial Number. Maximum 16 characters. | ALWAYS | AUTO |
| Manufacturer's | (0008,1090) | LO | "P200T", "P200DTx", "P200TE" or | ALWAYS | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Model Name | | | "P200TxE" | | |
| Device Serial Number | (0018,1000) | LO | Generated by device. Maximum 64 characters. | ALWAYS | AUTO |
| Software Version | (0018,1020) | LO | Current software versions of instrument. Maximum 64 characters. | ANAP | AUTO |

**Table 32: Enhanced General Equipment Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Software Version | (0018,1020) | LO | Current software versions of instrument. Maximum 64 characters. | ALWAYS | AUTO |

**Table 33: Enhanced Contrast/Bolus Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Contrast / Bolus Agent Sequence | (0018,0012) | SQ | Sequence contains one item: | ALWAYS | AUTO |
| > Code Value | (0008,0100) | SH | "C-B02CC" or "C-B0156" | ALWAYS | AUTO |
| > Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| > Code Meaning | (0008,0104) | LO | "Fluorescein" or "Indocyanine green" | ALWAYS | AUTO |
| > Contrast Bolus Agent Number | (0018,9337) | US | 1 | ALWAYS | AUTO |
| > Contrast / Bolus Administration Route Sequence | (0018,0014) | SQ | Sequence contains one item: | ALWAYS | AUTO |
| >> Code Value | (0008,0100) | SH | "G-D101" | ALWAYS | AUTO |
| >> Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >> Code Meaning | (0008,0104) | LO | "Intravenous route" | ALWAYS | AUTO |
| > Contrast/Bolus Ingredient Code Sequence | (0018,9338) | SQ | Zero Length | EMPTY | AUTO |
| > Contrast/Bolus Volume | (0018,1041) | DS | Zero Length | EMPTY | AUTO |
| > Contrast/Bolus Ingredient Concentration | (0018,1049) | DS | Zero Length | EMPTY | AUTO |
| > Contrast Administration Profile Sequence | (0018,9340) | SQ | Sequence contains one item: | ALWAYS | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| >> Contrast Bolus Volume | (0018,1041) | DS | Zero Length | EMPTY | AUTO |
| >> Contrast Bolus Start Time | (0018,1042) | TM | Date and time generated by device.<br><yyyymmddhhmmss.fff&zzxx> | ALWAYS | AUTO |

**Table 34: Ocular Region Imaged Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Anatomic Region Sequence | (0008,2218) | SQ | Sequence contains one item: | ALWAYS | AUTO |
| >Code Value | (0008,0100) | SH | "T-AA610" | ALWAYS | AUTO |
| >Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >Code Meaning | (0008,0104) | LO | "Retina" | ALWAYS | AUTO |
| Image Laterality | (0020,0062) | CS | From user input.<br>"L" or "R". | ALWAYS | USER |

**Table 35: SOP Common Module of Created SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Specific Character Set | (0008,0005) | CS | "ISO_IR 192" or "ISO_IR 100" | ALWAYS | CONFIG |
| SOP Class UID | (0008,0016) | UI | Generated by device. One of:<br>1.2.840.10008.5.1.4.1.1.77.1.5.1<br>1.2.840.10008.5.1.4.1.1.77.1.5.5<br>1.2.840.10008.5.1.4.1.1.77.1.5.4<br>1.2.840.10008.5.1.4.1.1.11.1 | ALWAYS | AUTO |
| SOP Instance UID | (0008,0018) | UI | Generated by device. | ALWAYS | AUTO |

### 7.1.1.7 Ophthalmic Photography 8 Bit Image Modules

#### Table 36: Ophthalmic Photography Series Module of Created Ophth 8-bit SOP Instances

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Modality | (0008,0060) | CS | "OP" | ALWAYS | AUTO |

#### Table 37: General Image Module of Created Ophth 8-bit SOP Instances

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Patient Orientation | (0020,0020) | CS | "L\F" | ALWAYS | AUTO |
| Image Comments | (0020,4000) | LT | User-defined comments about the image. | ANAP | USER |

#### Table 38: Image Pixel Module of Created Ophth 8-bit SOP Instances

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Rows | (0028,0010) | US | Rows in image. | ALWAYS | AUTO |
| Columns | (0028,0011) | US | Columns in image. | ALWAYS | AUTO |
| Bits Allocated | (0028,0100) | US | 8 | ALWAYS | AUTO |
| Bits Stored | (0028,0101) | US | 8 | ALWAYS | AUTO |
| High Bit | (0028,0102) | US | 7 | ALWAYS | AUTO |
| Pixel Data | (7FE0,0010) | OB | Image content. The Pixel data itself does not contain any burned-in annotation. | ALWAYS | AUTO |

#### Table 39: Multi-frame Module of Created Ophth 8-bit SOP Instances

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Number of Frames | (0028,0008) | US | 1 | ALWAYS | AUTO |
| Frame Increment Pointer | (0028,0029) | AT | (0008,002A) Acquisition DateTime | ALWAYS | AUTO |

**Table 40: Ophthalmic Photography Image Module of Created Ophth 8-bit SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Image Type | (0008,0008) | CS | Up to 8 fields separated by a backslash ('\') with defined values for each field as follows:-<br>**Field #1** ORIGINAL<br>**Field #2** PRIMARY<br>**Field #3** *Empty field*<br>**Field #4** *One of:* COLOR, RED, FA, ICG<br>**Field #5 (category)** *One of:*<br>OPTOMAP RG<br>OPTOMAP AF<br>OPTOMAPPLUS RG<br>OPTOMAPPLUS AF<br>OPTOMAPPLUS FA<br>OPTOMAPPLUS ICG<br>OCT INDEX IMAGE<br>**Field #6** *Empty field*<br>**Field #7** *Empty field*<br>**Field #8** *If part of a stereometric pair, one of:*<br>STEREO1<br>STEREO2 | ALWAYS | AUTO |
| Instance Number | (0020,0013) | IS | Generated by device. | ALWAYS | AUTO |
| Samples Per Pixel | (0028,0002) | US | 1 (monochrome) or<br>3 (composite). | ALWAYS | AUTO |
| Samples Per Pixel Used | (0028,0003) | US | Not present (monochrome) or<br>2 (composite). | ANAP | AUTO |
| Photometric Interpretation | (0028,0004) | CS | "MONOCHROME2" or "RGB". | ALWAYS | AUTO |
| Pixel Representation | (0028,0103) | US | 0 | ALWAYS | AUTO |
| Planar Configuration | (0028,0006) | US | Not present (monochrome) or<br>0 (composite). | ANAP | AUTO |
| Pixel Spacing | (0028,0030) | DS | Pixel spacing is mapped from device and image type.<br>A pair of fixed-point numbers, to 4 decimal places: <f.ffff\f.ffff> | ALWAYS | AUTO |
| Content Time | (0008,0033) | TM | Time image pixel data creation started.<br><hhmmss.fff> | ALWAYS | AUTO |
| Content Date | (0008,0023) | DA | Date image pixel data creation started.<br><yyyymmdd> | ALWAYS | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Acquisition Date/Time | (0008,002A) | DT | Date and time generated by device. <yyyymmddhhmmss.fff&zzxx> | ALWAYS | AUTO |
| Lossy Image Compression | (0028,2110) | CS | 00 | ALWAYS | AUTO |
| Presentation LUT Shape | (2050,0020) | CS | Not used for Composite images. "IDENTITY" for Monochrome images. | ANAP | AUTO |
| Burned In Annotation | (0028,0301) | CS | "NO" | ALWAYS | AUTO |

**Table 41: Ophthalmic Photography Acquisition Parameters Module of Created Ophth 8-bit SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Patient Eye Movement Commanded | (0022,0005) | CS | "NO" or "YES". | ALWAYS | USER |
| Patient Eye Movement Command Code Sequence | (0022,0006) | SQ | Sequence only present if Patient Eye Movement Commanded attribute has value of "YES". | ANAP | AUTO |
| >Code Value | (0008,0100) | SH | "R-404BF" or "R-404BC" or "R-404B6" or "R-404BD" | ALWAYS | USER |
| >Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >Code Meaning | (0008,0104) | LO | "Upward gaze" or "Left gaze" or "Downgaze" or "Right gaze" | ALWAYS | USER |
| Refractive State Sequence | (0022,001B) | SQ | Zero Length | EMPTY | AUTO |
| Emmetropic Magnification | (0022,000A) | FL | Zero Length | EMPTY | AUTO |
| Intra Ocular Pressure | (0022,000B) | FL | Zero Length | EMPTY | AUTO |
| Horizontal Field of View | (0022,000C) | FL | Zero length | EMPTY | AUTO |
| Pupil Dilated | (0022,000D) | CS | Zero Length | EMPTY | AUTO |

**Table 42: Ophthalmic Photographic Parameters Module of Created Ophth 8-bit SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Acquisition Device Type Code Sequence | (0022,0015) | SQ | Sequence contains one item: | ALWAYS | AUTO |
| >Code Value | (0008,0100) | SH | "A-00E8A" | ALWAYS | AUTO |
| >Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >Code Meaning | (0008,0104) | LO | "Scanning Laser Ophthalmoscope" | ALWAYS | AUTO |
| Illumination Type Code Sequence | (0022,0016) | SQ | Zero Length | EMPTY | AUTO |
| Light Path Filter type stack code sequence | (0022,0017) | SQ | Zero Length | EMPTY | AUTO |
| Image Path Filter type stack code sequence | (0022,0018) | SQ | Zero Length | EMPTY | AUTO |
| Lenses Code Sequence | (0022,0019) | SQ | Zero Length | EMPTY | AUTO |
| Channel Description Code Sequence | (0022,001A) | SQ | Sequence of one or more of the following items: | ALWAYS | AUTO |
| >Code Value | (0008,0100) | SH | "G-A11A" or "G-A11E" or "G-A12F". | ALWAYS | AUTO |
| >Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >Code Meaning | (0008,0104) | LO | "Red", "Green" or "Blue" | ALWAYS | AUTO |
| Detector Type | (0018,7004) | CS | Zero Length | EMPTY | AUTO |

**Table 43: Private Ophthalmic Photography Image Module of Created Ophth 8-bit SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Private Creator | (0021,0010) | LO | "OPTOS HEADER" | ALWAYS | AUTO |
| ProView | (0021,1000) | CS | "YES" or "NO" | ALWAYS | AUTO |
| SWL | (0021,1001) | CS | "NO" | ALWAYS | AUTO |
| Fovea Detection Algorithm Version | (0021,1010) | LO | Only present if ProView (0021,1000) is "YES". Maximum 64 chars. | ANAP | AUTO |
| Fovea Location | (0021,1011) | SL | Only present if ProView (0021,1000) is "YES". <x\y> pixel co-ordinates; any negative value indicates an unknown location. | ANAP | AUTO |
| Fovea Confidence | (0021,1012) | FD | Only present if ProView (0021,1000) is "YES". Value between 0 and 1. | ANAP | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Optic Disc Location | (0021,1013) | SL | Only present if ProView (0021,1000) is "YES". <br><br> <x\y> pixel co-ordinates; any negative value indicates an unknown location. | ANAP | AUTO |
| Optic Disc Confidence | (0021,1014) | FD | Only present if ProView (0021,1000) is "YES". <br><br> Value 0 or greater. | ANAP | AUTO |
| Unprojected Fovea Location | (0021,1021) | SL | Only present if ProView (0021,1000) is "YES". <br><br> Columns in unprojected image \ Rows in unprojected image; any negative value indicates an unknown location. | ANAP | AUTO |
| Unprojected Optic Disc Location | (0021,1022) | SL | Only present if ProView (0021,1000) is "YES". <br><br> Columns in unprojected image \ Rows in unprojected image; any negative value indicates an unknown location. | ANAP | AUTO |
| Projection Algorithm Type | (0021,1023) | CS | Only present if ProView (0021,1000) is "YES". <br><br> "FF" – fast fixed projection or "GP" – general projection | ANAP | AUTO |
| Projection Algorithm Table | (0021,1024) | LT | Only present if ProView (0021,1000) is "YES". <br><br> Projection table name used in projection | ANAP | AUTO |
| Projection Algorithm Name | (0021,1025) | LT | Only present if ProView (0021,1000) is "YES" . <br><br> "OPTOS_FAST_FIXED" or "OPTOS_GENERAL_PROJECTION" | ANAP | AUTO |
| Projection Algorithm Version | (0021,1026) | LT | Only present if ProView (0021,1000) is "YES". <br><br> Version of stereographic projection algorithm, e.g. "1.0.0" | ANAP | AUTO |
| Sharpening Applied | (0021,1031) | CS | Only present if Image Type category is one of: OPTOMAP RG, OPTOMAPPLUS RG <br> Enumerated values: <br> "YES" or "NO" | ANAP | AUTO |
| Sharpening Settings | (0021,1032) | DS | Only present if Image Type category is one of: OPTOMAP RG, OPTOMAPPLUS RG <br><br> Repeated sequence of 4 fields per image channel (8 fields in total). Field values separated by a backslash ('\'). | ANAP | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Optos Procedure Description | (0021, 1093) | LO | Value supplied via User Input. Maximum 64 characters. | VNAP | USER |
| Unprocessed Slo Image | (0021, 1098) | OB | Image binary. Only present if provided by the device. | ANAP | AUTO |

### 7.1.1.8 Widefield Ophthalmic Photography Stereographic Projection Image Modules

**Table 44: Ophthalmic Photography Series Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Modality | (0008,0060) | CS | "OP" | ALWAYS | AUTO |

**Table 45: General Image Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Patient Orientation | (0020,0020) | CS | "L\F" | ALWAYS | AUTO |
| Image Comments | (0020,4000) | LT | User-defined comments about the image. | ANAP | USER |

**Table 46: Image Pixel Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Rows | (0028,0010) | US | Rows in image. | ALWAYS | AUTO |
| Columns | (0028,0011) | US | Columns in image. | ALWAYS | AUTO |
| Bits Allocated | (0028,0100) | US | 8 | ALWAYS | AUTO |
| Bits Stored | (0028,0101) | US | 8 | ALWAYS | AUTO |
| High Bit | (0028,0102) | US | 7 | ALWAYS | AUTO |
| Pixel Data | (7FE0,0010) | OB | Image content. The Pixel data itself does not contain any burned-in annotation. | ALWAYS | AUTO |

**Table 47: Multi-frame Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Number of Frames | (0028,0008) | US | 1 | ALWAYS | AUTO |
| Frame Increment Pointer | (0028,0029) | AT | (0008,002A) Acquisition DateTime | ALWAYS | AUTO |

**Table 48: Ophthalmic Photography Image Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Image Type | (0008,0008) | CS | Up to 8 fields separated by a backslash ('\') with defined values for each field as follows:-<br>**Field #1** ORIGINAL<br>**Field #2** PRIMARY<br>**Field #3** *Empty field*<br>**Field #4** *One of:* COLOR, RED, FA, ICG<br>**Field #5 (category)** *One of:*<br>OPTOMAP RG<br>OPTOMAP AF<br>OPTOMAPPLUS RG<br>OPTOMAPPLUS AF<br>OPTOMAPPLUS FA<br>OPTOMAPPLUS ICG<br>OCT INDEX IMAGE<br>**Field #6** *Empty field*<br>**Field #7** *Empty field*<br>**Field #8** *If part of a stereometric pair, one of:*<br>STEREO1<br>STEREO2 | ALWAYS | AUTO |
| Instance Number | (0020,0013) | IS | Generated by device. | ALWAYS | AUTO |
| Samples Per Pixel | (0028,0002) | US | 1 (monochrome) or<br>3 (composite). | ALWAYS | AUTO |
| Samples Per Pixel Used | (0028,0003) | US | Not present (monochrome) or<br>2 (composite). | ANAP | AUTO |
| Photometric Interpretation | (0028,0004) | CS | "MONOCHROME2" or "RGB". | ALWAYS | AUTO |
| Pixel Representation | (0028,0103) | US | 0 | ALWAYS | AUTO |
| Planar Configuration | (0028,0006) | US | Not present (monochrome) or<br>0 (composite). | ANAP | AUTO |
| Content Time | (0008,0033) | TM | Time image pixel data creation started.<br><hhmmss.fff> | ALWAYS | AUTO |
| Content Date | (0008,0023) | DA | Date image pixel data creation started.<br><yyyymmdd> | ALWAYS | AUTO |
| Acquisition Date/Time | (0008,002A) | DT | Date and time generated by device.<br><yyyymmddhhmmss.fff&zzxx> | ALWAYS | AUTO |
| Lossy Image Compression | (0028,2110) | CS | 00 | ALWAYS | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Presentation LUT Shape | (2050,0020) | CS | Not used for Composite images. "IDENTITY" for Monochrome images. | ANAP | AUTO |
| Burned In Annotation | (0028,0301) | CS | "NO" | ALWAYS | AUTO |

**Table 49: Widefield Ophthalmic Photography Stereographic Projection Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Anatomic Region Sequence | (0008,2218) | SQ | Sequence containing a single item. | ALWAYS | AUTO |
| >Code Value | (0008,0100) | SH | "T-AA610" | ALWAYS | AUTO |
| >Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >Code Meaning | (0008,0104) | LO | "Retina" | ALWAYS | AUTO |
| > Anatomic Region Modifier Sequence | (0008,2218) | SQ | Sequence containing a single item. | ALWAYS | AUTO |
| >>Code Value | (0008,0100) | SH | "G-A100" or "G-A101" | ALWAYS | USER |
| >>Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >>Code Meaning | (0008,0104) | LO | "Right" or "Left" | ALWAYS | USER |
| Transformation Algorithm Sequence | (0022,1513) | SQ | Sequence containing a single item: | ALWAYS | AUTO |
| > Algorithm Family Code Sequence | (0066,002F) | SQ | Sequence containing a single item: | ALWAYS | AUTO |
| >> Code Value | (0008,0100) | SH | "111791" | ALWAYS | AUTO |
| >> Coding Scheme Designator | (0008,0102) | SH | "DCM" | ALWAYS | AUTO |
| >> Code Meaning | (0008,0104) | LO | "Spherical projection" | ALWAYS | AUTO |
| > Algorithm Name | (0066,0036) | LO | "OPTOS_FAST_FIXED" or "OPTOS_GENERAL_PROJECTION" | ALWAYS | AUTO |
| > Algorithm Version | (0066,0031) | LO | Version of stereographic projection algorithm, e.g. "1.0.0" | ALWAYS | AUTO |
| Ophthalmic Axial Length | (0022,1019) | FL | The axial length measurement used for the stereographic projection, in mm. | ALWAYS | AUTO |
| Ophthalmic Axial Length Method | (0022,1515) | CS | One of: "MEASURED", "ESTIMATED", "POPULATION" | ALWAYS | AUTO |

| | | | | | |
|---|---|---|---|---|---|
| X Coordinate Center Pixel View Angle | (0022,1528) | FL | The horizontal angle covered on the sphere by the center pixel of the projected image. | ALWAYS | AUTO |
| Y Coordinate Center Pixel View Angle | (0022,1529) | FL | The vertical angle covered on the sphere by the center pixel of the projected image. | ALWAYS | AUTO |

**Table 50: Ophthalmic Photography Acquisition Parameters Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Patient Eye Movement Commanded | (0022,0005) | CS | "NO" or "YES". | ALWAYS | USER |
| Patient Eye Movement Command Code Sequence | (0022,0006) | SQ | Sequence only present if Patient Eye Movement Commanded attribute has value of "YES". | ANAP | AUTO |
| >Code Value | (0008,0100) | SH | "R-404BF" or "R-404BC" or "R-404B6" or "R-404BD" | ALWAYS | USER |
| >Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >Code Meaning | (0008,0104) | LO | "Upward gaze" or "Left gaze" or "Downgaze" or "Right gaze" | ALWAYS | USER |
| Refractive State Sequence | (0022,001B) | SQ | Zero Length | EMPTY | AUTO |
| Emmetropic Magnification | (0022,000A) | FL | Zero Length | EMPTY | AUTO |
| Intra Ocular Pressure | (0022,000B) | FL | Zero Length | EMPTY | AUTO |
| Horizontal Field of View | (0022,000C) | FL | Zero length | EMPTY | AUTO |
| Pupil Dilated | (0022,000D) | CS | Zero Length | EMPTY | AUTO |

**Table 51: Ophthalmic Photographic Parameters Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Acquisition Device Type Code Sequence | (0022,0015) | SQ | N/A | ALWAYS | AUTO |
| >Code Value | (0008,0100) | SH | "A-00E8A" | ALWAYS | AUTO |
| >Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| >Code Meaning | (0008,0104) | LO | "Scanning Laser Ophthalmoscope" | ALWAYS | AUTO |
| Illumination Type Code Sequence | (0022,0016) | SQ | Zero Length | EMPTY | AUTO |
| Light Path Filter type stack code sequence | (0022,0017) | SQ | Zero Length | EMPTY | AUTO |
| Image Path Filter type stack code sequence | (0022,0018) | SQ | Zero Length | EMPTY | AUTO |
| Lenses Code Sequence | (0022,0019) | SQ | Zero Length | EMPTY | AUTO |
| Channel Description Code Sequence | (0022,001A) | SQ | Sequence of one or more of the following elements | ALWAYS | AUTO |
| >Code Value | (0008,0100) | SH | "G-A11A" or "G-A11E" or "G-A12F". | ALWAYS | AUTO |
| >Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >Code Meaning | (0008,0104) | LO | "Red", "Green" or "Blue" | ALWAYS | AUTO |
| Detector Type | (0018,7004) | CS | Zero Length | EMPTY | AUTO |

**Table 52: ICC Profile Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| ICC Profile | (0028,2000) | OB | An ICC Profile encoding the transformation of device-dependent color stored pixel values into PCS-Values | VNAP | AUTO |

**Table 53: Private Ophthalmic Photography Image Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Private Creator | (0021,0010) | LO | "OPTOS HEADER" | ALWAYS | AUTO |
| ProView | (0021,1000) | CS | "YES" | ALWAYS | AUTO |
| SWL | (0021,1001) | CS | "NO" | ALWAYS | AUTO |
| Fovea Detection Algorithm Version | (0021,1010) | LO | Only present if ProView (0021,1000) is "YES". Maximum 64 chars. | ANAP | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Fovea Location | (0021,1011) | SL | Only present if ProView (0021,1000) is "YES".<br><br><x\y> pixel co-ordinates; any negative value indicates an unknown location. | ANAP | AUTO |
| Fovea Confidence | (0021,1012) | FD | Only present if ProView (0021,1000) is "YES".<br><br>Value between 0 and 1. | ANAP | AUTO |
| Optic Disc Location | (0021,1013) | SL | Only present if ProView (0021,1000) is "YES".<br><br><x\y> pixel co-ordinates; any negative value indicates an unknown location. | ANAP | AUTO |
| Optic Disc Confidence | (0021,1014) | FD | Only present if ProView (0021,1000) is "YES".<br><br>Value 0 or greater. | ANAP | AUTO |
| Unprojected Fovea Location | (0021,1021) | SL | Only present if ProView (0021,1000) is "YES".<br><br>Columns in unprojected image \ Rows in unprojected image; any negative value indicates an unknown location. | ANAP | AUTO |
| Unprojected Optic Disc Location | (0021,1022) | SL | Only present if ProView (0021,1000) is "YES".<br><br>Columns in unprojected image \ Rows in unprojected image; any negative value indicates an unknown location. | ANAP | AUTO |
| Projection Algorithm Type | (0021,1023) | CS | "FF" – fast fixed projection or "GP" – general projection | ANAP | AUTO |
| Projection Algorithm Table | (0021,1024) | LT | Projection table name used in projection | ANAP | AUTO |
| Projection Algorithm Name | (0021,1025) | LT | "OPTOS_FAST_FIXED" or "OPTOS_GENERAL_PROJECTION" | ANAP | AUTO |
| Projection Algorithm Version | (0021,1026) | LT | Version of stereographic projection algorithm, e.g. "1.0.0" | ANAP | AUTO |
| Sharpening Applied | (0021,1031) | CS | Only present if Image Type category is one of: OPTOMAP RG, OPTOMAPPLUS RG<br><br>Enumerated values:<br>"YES" or "NO" | ANAP | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Sharpening Settings | (0021,1032) | DS | Only present if Image Type category is one of: OPTOMAP RG, OPTOMAPPLUS RG<br><br>Repeated sequence of 4 fields per image channel (8 fields in total). Field values separated by a backslash ('\'). | ANAP | AUTO |
| Optos Procedure Description | (0021, 1093) | LO | Value supplied via User Input. Maximum 64 characters. | VNAP | USER |
| Unprocessed Slo Image | (0021, 1098) | OB | Image binary.<br>Only present if provided by the device. | ANAP | AUTO |

### 7.1.1.9 Ophthalmic Tomography Image Modules

**Table 54: Ophthalmic Tomography Series Module of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Modality | (0008,0060) | CS | "OPT" | ALWAYS | AUTO |

**Table 55: General Image Module of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Patient Orientation | (0020,0020) | CS | "L\A" | ALWAYS | AUTO |
| Image Comments | (0020,4000) | LT | User-defined comments about the image. | ANAP | USER |

**Table 56: Image Pixel Module of Created Widefield Oph SP SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Rows | (0028,0010) | US | Rows in each image frame. | ALWAYS | AUTO |
| Columns | (0028,0011) | US | Columns in each image frame. | ALWAYS | AUTO |
| Pixel Data | (7FE0,0010) | OB | Image content. The Pixel data itself does not contain any burned-in annotation. | ALWAYS | AUTO |

**Table 57: Multi-frame Dimension Module of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Dimension Organization Sequence | (0020,9221) | SQ | Empty Group | EMPTY | AUTO |
| Dimension Index Sequence | (0020,9222) | SQ | Empty Group | EMPTY | AUTO |

**Table 58: Acquisition Context Module of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Acquisition Context Sequence | (0040,0555) | SQ | Empty Group | EMPTY | AUTO |

**Table 59: Multi-frame Functional Groups Module of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Shared Functional Groups Sequence | (5200,9229) | SQ | Sequence contains a single item: | EMPTY | AUTO |
| > *Include Referenced Image Functional Group Macro* | | | *See* Table 60 | ALWAYS | N/A |
| > *Include Frame Anatomy Functional Group Macro* | | | *See* **Error! Reference source not found.** | ALWAYS | N/A |
| Per-frame Functional Groups Sequence | (5200,9230) | SQ | Sequence containing an item for every frame in the OCT image: | ALWAYS | AUTO |
| > *Include Pixel Measures Functional Group Macro* | | | *See* Table 61 | ALWAYS | N/A |
| > *Include Frame Content Functional Group Macro* | | | *See* Table 63 | ALWAYS | N/A |
| > *Include Ophthalmic Frame Location Functional Group Macro* | | | *See* Table 64 | ALWAYS | N/A |

**Table 60: Referenced Image Functional Group Macro of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Referenced Image Sequence | (0008,1140) | SQ | 1 group | ALWAYS | AUTO |
| > Referenced SOP Class UID | (0008,1150) | UI | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | ALWAYS | AUTO |
| > Referenced SOP Instance UID | (0008,1155) | UI | UID of SLO image instance | ALWAYS | AUTO |
| > Referenced Frame Number | (0008,1160) | IS | "1" | ALWAYS | AUTO |
| > Purpose of Reference Code Sequence | (0040,A170) | SQ | Sequence contains a single item: | ALWAYS | AUTO |
| >> Code Value | (0008,0100) | SH | "121311" | ALWAYS | AUTO |
| >> Coding Scheme Designator | (0008,0102) | SH | "DCM" | ALWAYS | AUTO |
| >> Code Meaning | (0008,0104) | LO | "Localizer" | ALWAYS | AUTO |
| > Referenced SOP Class UID | (0008,1150) | UI | Only present if the image derived from or has created another image.<br><br>UID of referenced image class | ANAP | AUTO |
| > Referenced SOP Instance UID | (0008,1155) | UI | Only present if the image derived from or has created another image.<br><br>UID of referenced image instance | ANAP | AUTO |

| > Purpose of Reference Code Sequence | (0040,A170) | SQ | Only present if the image derived from or has created another image.<br><br>Sequence contains a single item: | ANAP | AUTO |
|---|---|---|---|---|---|
| >> Code Value | (0008,0100) | SH | Only present if the image derived from or has created another image.<br><br>"121338" | ANAP | AUTO |
| >> Coding Scheme Designator | (0008,0102) | SH | Only present if the image derived from or has created another image.<br><br>"DCM" | ANAP | AUTO |
| >> Code Meaning | (0008,0104) | LO | Only present if the image derived from or has created another image.<br><br>"Anatomic image" | ANAP | AUTO |
| > Referenced SOP Class UID | (0008,1150) | UI | Only present if the image is a temporal successor to another image.<br><br>UID of referenced image class | ANAP | AUTO |
| > Referenced SOP Instance UID | (0008,1155) | UI | Only present if the image is a temporal successor to another image.<br><br>UID of referenced image instance | ANAP | AUTO |
| > Purpose of Reference Code Sequence | (0040,A170) | SQ | Only present if the image is a temporal successor to another image.<br><br>Sequence contains a single item: | ANAP | AUTO |
| >> Code Value | (0008,0100) | SH | Only present if the image is a temporal successor to another image.<br><br>"121348" | ANAP | AUTO |
| >> Coding Scheme Designator | (0008,0102) | SH | Only present if the image is a temporal successor to another image.<br><br>"DCM" | ANAP | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| >> Code Meaning | (0008,0104) | LO | Only present if the image derived from or has created another image.<br><br>"Temporal Predecessor" | ANAP | AUTO |

**Table 61: Pixel Measures Functional Group Macro of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Pixel Measures Sequence | (0028,9110) | SQ | Sequence contains a single item: | ALWAYS | AUTO |
| > Pixel Spacing | (0028,0030) | DS | Adjacent row spacing \ adjacent column spacing in mm. A pair of fixed point numbers to 4 decimal places: <f.ffff\f.ffff> | ALWAYS | AUTO |

**Table 62: Frame Anatomy Functional Group Macro of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Frame Anatomy Sequence | (0020,9071) | SQ | Sequence contains a single item: | ALWAYS | AUTO |
| > Anatomic Region Sequence | (0008, 2218) | SQ | Sequence contains a single item: | ALWAYS | AUTO |
| >> Code Value | (0008,0100) | SH | "T-AA610" | ALWAYS | AUTO |
| >> Coding Scheme Designator | (0008,0102) | SH | "SRT" | ALWAYS | AUTO |
| >> Code Meaning | (0008,0104) | LO | Retina | ALWAYS | AUTO |
| > Frame Laterality | (0020,9072) | CS | "R" = Right or OD,<br>"L" =Left or OS | ALWAYS | USER |

**Table 63: Frame Content Functional Group Macro of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Frame Content Sequence | (0020,9111) | SQ | Sequence contains a single item: | ALWAYS | AUTO |
| > Frame Acquisition Datetime | (0018,9074) | DT | <yyyymmddhhmmss.fff&zzxx> | ALWAYS | AUTO |
| > Frame Reference Datetime | (0018,9151) | DT | <yyyymmddhhmmss.fff&zzxx> | ALWAYS | AUTO |
| > Frame Acquisition Duration | (0018,9220) | FD | The actual amount of time [in milliseconds] that was used to acquire data for this frame | ALWAYS | AUTO |

**Table 64: Ophthalmic Frame Location Functional Group Macro of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|

| Ophthalmic Frame Location Sequence | (0022,0031) | SQ | Sequence contains a single item: | ALWAYS | AUTO |
|---|---|---|---|---|---|
| > Referenced SOP Class UID | (0008,1150) | UI | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | ALWAYS | AUTO |
| > Referenced SOP Instance UID | (0008,1155) | UI | UID of SLO image instance | ALWAYS | AUTO |
| > Referenced Frame Number | (0008,1160) | IS | "1" | ALWAYS | AUTO |
| > Purpose of Reference Code Sequence | (0040,A170) | SQ | Sequence contains a single item: | ALWAYS | AUTO |
| >>Code Value | (0008,0100) | SH | "121311" | ALWAYS | AUTO |
| >> Coding Scheme Designator | (0008,0102) | SH | "DCM" | ALWAYS | AUTO |
| >> Code Meaning | (0008,0104) | LO | "Localizer" | ALWAYS | AUTO |
| > Reference Coordinates | (0022,0032) | FL | Location on SLO Image. Row, Column values for the referenced image pixel coordinates. | ALWAYS | AUTO |
| > Ophthalmic Image Orientation | (0022,0039) | CS | "NONLINEAR" for RNFL otherwise "LINEAR" | ALWAYS | AUTO |
| > *Include Private Ophthalmic Frame Location Functional Group Macro* | | | *See table 55* | ALWAYS | N/A |

**Table 65: Private Ophthalmic Frame Location Functional Group Macro of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Private Creator | (0021,0010) | LO | "OPTOS HEADER" | ALWAYS | AUTO |
| OCT Frame Location Confidence | (0021,1065) | IS | Percentage confidence in OCT frame location: Integer value between 0 and 100 | ALWAYS | AUTO |

**Table 66: Ophthalmic Tomography Image Module of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|

| Image Type | (0008,0008) | CS | Image Type String. 5 fields separated by a backslash ('\') with defined values for each field as follows:-  **Field #1** ORIGINAL  **Field #2** PRIMARY  **Field #3** POSTERIOR OCT *or* UWF OCT  **Field #4** *Empty field*  **Field #5 (category)** *If field #3 is POSTERIOR OCT, then one of:*  ONH  RNFL  RETINA  LINE  RASTER  *If UWF OCT, then one of:*  NAV LINE  NAV EXT LINE  NAV VOLUME  NAV HD VOLUME | ALWAYS | AUTO |
|---|---|---|---|---|---|
| Samples Per Pixel | (0028,0002) | US | 1 | ALWAYS | AUTO |
| Acquisition DateTime | (0008,002A) | DT | <yyyymmddhhss.fff&zzxx> | ALWAYS | AUTO |
| Acquisition Duration | (0018,9073) | FD | Varies by scan type | ALWAYS | AUTO |
| Acquisition Number | (0020,0012) | IS | "0" | ALWAYS | AUTO |
| Photometric Interpretation | (0028,0004) | CS | "MONOCHROME2" | ALWAYS | AUTO |
| Pixel Representation | (0028,0103) | US | 0 | ALWAYS | AUTO |
| Bits Allocated | (0028,0100) | US | 8 | ALWAYS | AUTO |
| Bits Stored | (0028,0101) | US | 8 | ALWAYS | AUTO |
| High Bit | (0028,0102) | US | 7 | ALWAYS | AUTO |
| Presentation LUT Shape | (2050,0020) | CS | "IDENTITY" | ALWAYS | AUTO |
| Lossy Image Compression | (0028,2110) | CS | "00" | ALWAYS | AUTO |
| Burned In Annotation | (0028,0301) | CS | "NO" | ALWAYS | AUTO |
| Concatenation Frame Offset Number | (0020,9228) | UL | 0 | ALWAYS | AUTO |
| In-concatenation Number | (0020,9162) | US | 1 | ALWAYS | AUTO |
| In-concatenation Total Number | (0020,9163) | US | 1 | ALWAYS | AUTO |

| Instance Number | (0020,0013) | IS | A number that identifies this instance | ALWAYS | AUTO |
| Content Date | (0008,0023) | DA | <yyyymmdd> | ALWAYS | AUTO |
| Content Time | (0008,0033) | TM | <hhmmss.fff> | ALWAYS | AUTO |
| Number of Frames | (0028,0008) | IS | Number of frames in a multi-frame image | ALWAYS | AUTO |

**Table 67: Ophthalmic Tomography Acquisition Parameters Module of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Axial Length of the Eye | (0022,0030) | FL | Axial length of the eye in mm. | VNAP | AUTO |
| Refractive State Sequence | (0022,001B) | SQ | Empty group | EMPTY | AUTO |
| Emmetropic Magnification | (0022,000A) | FL | Zero length | EMPTY | AUTO |
| Intra Ocular Pressure | (0022,000B) | FL | Zero length | EMPTY | AUTO |
| Horizontal Field of View | (0022,000C) | FL | Zero length | EMPTY | AUTO |
| Pupil Dilated | (0022,000D) | CS | Zero length | EMPTY | AUTO |

**Table 68: Ophthalmic Tomography Parameters Module of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Acquisition Device Type Code Sequence | (0022,0015) | SQ | Sequence contains a single item: | ALWAYS | AUTO |
| >Code Value | (0008,0100) | SH | "SRT" | ALWAYS | AUTO |
| >Coding Scheme Designator | (0008,0102) | SH | "A-00FBE" | ALWAYS | AUTO |
| >Code Meaning | (0008,0104) | LO | "Optical Coherence Tomography Scanner" | ALWAYS | AUTO |
| Light Path Filter Type Stack Code Sequence | (0022,0017) | SQ | Empty sequence | EMPTY | AUTO |
| Detector Type | (0018,7004) | CS | "CCD" | ALWAYS | AUTO |
| Illumination Wave Length | (0022,0055) | FL | Generated by device | ALWAYS | AUTO |
| Illumination Power | (0022,0056) | FL | Generated by device | ALWAYS | AUTO |
| Illumination Bandwidth | (0022,0057) | FL | Generated by device | ALWAYS | AUTO |
| Depth Spatial Resolution | (0022,0035) | FL | Generated by device | ALWAYS | AUTO |
| Maximum Depth Distortion | (0022,0036) | FL | Generated by device | ALWAYS | AUTO |

| Along-scan Spatial Resolution | (0022,0037) | FL | Generated by device | ALWAYS | AUTO |
|---|---|---|---|---|---|
| Maximum Along-scan Distortion | (0022,0038) | FL | Generated by device | ALWAYS | AUTO |
| Across-scan Spatial Resolution | (0022,0048) | FL | Generated by device | ALWAYS | AUTO |
| Maximum Across-scan Distortion | (0022,0049) | FL | Generated by device | ALWAYS | AUTO |

**Table 69: Private Ophthalmic Tomography Image Module of Created OPT SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Private Creator | (0021,0010) | LO | "OPTOS HEADER" | ALWAYS | AUTO |
| RNFL Center Coordinates | (0021,1050) | FL | Only present if Image Type category is "RNFL". <x\y> pixel coordinates. | ANAP | AUTO |
| RNFL Start Coordinates | (0021,1051) | FL | Only present if Image Type category is "RNFL". <x\y> pixel coordinates. | ANAP | AUTO |
| RNFL Scan Direction | (0021,1052) | CS | Only present if Image Type category is "RNFL". One of: "CLOCKWISE" or "COUNTERCLOCKWISE" | ANAP | AUTO |
| OCT SNR Value | (0021,1060) | US | Integer value between 0 and 10 | ALWAYS | AUTO |
| OCT Blink Detected Count | (0021,1061) | SH | "n/m" frames. | ANAP | AUTO |
| OCT Movement Detected Count | (0021,1062) | SH | "n/m" frames. | ANAP | AUTO |
| OCT Averages Count | (0021,1063) | SH | "n/m" frames. | ANAP | AUTO |
| OCT Scan Position Error | (0021,1064) | SH | Diagnostic message generated by device. | ANAP | AUTO |
| OCT Frame Location Confidence | (0021,1065) | IS | 100 | ANAP | AUTO |
| OCT Blink Detected | (0021,1066) | SH | Diagnostic message generated by device. | ANAP | AUTO |
| OCT Movement Detected | (0021,1067) | SH | Diagnostic message generated by device.. | ANAP | AUTO |
| OCT Fovea Location | (0021,1071) | FL | Only present if segmentation analysis is enabled and the scan type is "Retina". <column\b-scan number> coordinates. | ANAP | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| OCT Segmentation Outcome | (0021,1073) | SH | Only present if segmentation analysis is enabled.<br>Diagnostic message generated by device. | ANAP | AUTO |
| OCT Segmentation Diagnostic | (0021,1074) | SH | Only present if the segmentation analysis is enabled but fails.<br>Diagnostic message generated by device. | ANAP | AUTO |
| OCT Segmentation Disc Center Location | (0021, 107D) | FL | Only present if segmentation analysis is enabled and the scan type is "ONH".<br><column\b-scan number> coordinates. | ANAP | AUTO |
| OCT Segmentation Disc 3D Location | (0021, 107E) | FL | Only present if segmentation analysis is enabled and the scan type is "ONH".<br>Multi-valued series of <column\row\b-scan number> coordinates indicating X/Y/Z of points describing the perimeter of the disc. | ANAP | AUTO |
| OCT Segmentation Cup 3D Location | (0021, 107F) | FL | Only present if segmentation analysis is enabled and the scan type is "ONH".<br>Multi-valued series of <column\row\b-scan number> coordinates indicating X/Y/Z of points describing the perimeter of the cup. | ANAP | AUTO |
| Optos Procedure Description | (0021, 1093) | LO | Value supplied via User Input. Maximum 64 characters. | VNAP | USER |
| OCT SLO Reference Image | (0021, 1094) | OB | Image binary.<br>Only present if provided by the device | ANAP | AUTO |
| OCT Scan Angle Degree | (0021, 1095) | FL | Only present if provided by the device<br>Scan Rotation from reference image. | ANAP | AUTO |
| OCT Scan Center Location | (0021, 1096) | SL | Only present if provided by the device<br><x\y> pixel coordinates. | ANAP | AUTO |
| OCT SLO Thumbnail Image | (0021,1097) | OB | Image binary.<br>Only present if provided by the device | ANAP | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| OCT Segmentation Fovea Detection Confidence | (0021, 1099) | FL | Only present if segmentation analysis is enabled and the scan type is "Retina". <br> Floating point number. | ANAP | AUTO |
| OCT Segmentation Fovea Detection Outcome | (0021, 109A) | SH | Only present if segmentation analysis is enabled and the scan type is "Retina". <br> Diagnostic message generated by device. | ANAP | AUTO |

### 7.1.1.10    Grayscale Softcopy Presentation State Modules

**Table 70: Presentation Series Module of Created GSPS SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Modality | (0008,0060) | CS | "PR" | ALWAYS | AUTO |
| Series Description | (0008,103E) | LO | Derived from the Series Description of the series being presented, with a suffix of "(Presentation)". Maximum 64 chars. | ALWAYS | AUTO |

**Table 71: Presentation State Identification Module of Created GSPS SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Presentation Creation Date | (0070,0082) | DA | <yyyymmdd> | ALWAYS | AUTO |
| Presentation Creation Time | (0070,0083) | TM | <hhmmss.fff> | ALWAYS | AUTO |
| Instance Number | (0020,0013) | IS | One PR per study, so value is always "1" | ALWAYS | AUTO |
| Content Label | (0070,0080) | CS | "OPH SLO PR" or "RETINAL LAYERS" | ALWAYS | AUTO |
| Content Description | (0070,0081) | LO | "OPTOS RETINAL SLO IMAGE DISPLAY" or "OPTOS RETINAL LAYERS SEGMENTATION" | ALWAYS | AUTO |
| Content Creator's Name | (0070,0084) | PN | Zero length | EMPTY | AUTO |

**Table 72: Presentation State Relationship Module of Created GSPS SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Referenced Series Sequence | (0008,1115) | SQ | Sequence containing an item for every Series Instance UID, SOP Class UID combination that is presented by this PR: | ALWAYS | AUTO |
| > Series Instance UID | (0020,000E) | UI | UID of a series that is part of the same Study as this PR. | ALWAYS | AUTO |
| > Referenced Image Sequence | (0008,1140) | SQ | Sequence containing an item for every image within the referenced Series Instance UID that is presented this PR. | ALWAYS | AUTO |
| >> Referenced SOP Class UID | (0008,1150) | UI | SOP Class UID of presented image. All items within this sequence have the same SOP Class UID. | ALWAYS | AUTO |
| >> Referenced SOP Instance UID | (0008,1155) | UI | SOP Instance UID of presented image. | ALWAYS | AUTO |

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| >> Referenced Frame Number | (0008,1160) | IS | Not present if all frames within the refererenced SOP Instance UID are presented by this PR. | ANAP | AUTO |

**Table 73: Displayed Area Module of Created GSPS SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Displayed Area Selection Sequence | (0070,005A) | SQ | Sequence containing an item for every displayed area section. Every image and frame listed in the Presentation State Relationship Module is described: | ALWAYS | AUTO |
| > Referenced Image Sequence | (0008,1140) | SQ | Sequence containing an item for every image within some subset of the Presentation State Relationship Modul to which this displayed area selection applies: | ALWAYS | AUTO |
| >> Referenced SOP Class UID | (0008,1150) | UI | SOP Class UID of an image to which this dislayed area selection applies. | ALWAYS | AUTO |
| >> Referenced SOP Instance UID | (0008,1155) | UI | SOP Instance UID of an image to which this dislayed area selection applies. | ALWAYS | AUTO |
| >> Referenced Frame Number | (0008,1160) | IS | Not present if all frames within the refererenced SOP Instance UID are included within this displayed area selection. | ANAP | AUTO |
| > Displayed Area Top Left Hand Corner | (0070,0052) | SL | Top-left pixel to be displayed. <x\y> | ALWAYS | AUTO |
| > Displayed Area Bottom Right Hand Corner | (0070,0053) | SL | Bottom-right pixel to be displayed. <x\y> | ALWAYS | AUTO |
| > Presentation Size Mode | (0070,0100) | CS | "SCALE TO FIT" | ALWAYS | AUTO |

**Table 74: Graphic Annotation Module of Created GSPS SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Graphic Annotation Sequence | (0070,0001) | SQ | Sequence containing one or more items: | ALWAYS | AUTO |
| > Referenced Image Sequence | (0008,1140) | SQ | Sequence containing an item for every image within some subset of the Presentation State Relationship Modul to which this annotation selection applies: | ALWAYS | AUTO |
| >> Referenced SOP Class UID | (0008,1150) | UI | SOP Class UID of an image to which this annotation applies. | ALWAYS | AUTO |

| | | | | | |
|---|---|---|---|---|---|
| >> Referenced SOP Instance UID | (0008,1155) | UI | SOP Instance UID of an image to which this annotation applies. | ALWAYS | AUTO |
| >> Referenced Frame Number | (0008,1160) | IS | The frame to which this annotation applies.<br><br>Not present if the annotation applies to all frames within the refererenced image. | ANAP | AUTO |
| > Graphic Layer | (0070,0002) | CS | Label of the layer on which this annotation is to be displayed. | ALWAYS | AUTO |
| > Graphic Object Sequence | (0070,0009) | SQ | Sequence describing a graphic annotation. Contains one or more items. | ALWAYS | AUTO |
| >> Graphic Annotation Units | (0070,0005) | CS | "PIXEL" | ALWAYS | AUTO |
| >> Graphic Dimensions | (0070,0020) | US | 2 | ALWAYS | AUTO |
| >> Number of Graphic Points | (0070,0021) | US | Number of data points in this graphic. | ALWAYS | AUTO |
| >> Graphic Data | (0070,0022) | FL | Coordinates specifying the graphic annotation. | ALWAYS | AUTO |
| >> Graphic Type | (0070,0023) | CS | One of: "POINT", "POLYLINE" | ALWAYS | AUTO |

**Table 75: Graphic Layer Module of Created GSPS SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Graphic Layer Sequence | (0070,0060) | SQ | Sequence containing one or more items: | ALWAYS | AUTO |
| > Graphic Layer | (0070,0002) | CS | Label used to identify the layer. Maximum 16 chars. | ALWAYS | AUTO |
| > Graphic Layer Order | (0070,0062) | IS | Integer indicating rendering order for layer. | ALWAYS | AUTO |

**Table 76: Softcopy Presentation State LUT of Created GSPS SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Presentation LUT Shape | (2050,0020) | CS | "IDENTITY" | ALWAYS | AUTO |

### 7.1.1.11         Stereometric Relationship Modules

**Table 77: Stereometric Series Module of Created SRS SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Modality | (0008,0060) | CS | "SMR" | ALWAYS | AUTO |

**Table 78: Stereometric Relationship Module of Created SRS SOP Instances**

| Attribute Name | Tag | VR | Value | Usage | Source |
|---|---|---|---|---|---|
| Stereo Pairs Sequence | (0022,0020) | SQ | Sequence containing one or more items: | ALWAYS | AUTO |
| >Left Image Sequence | (0022,0021) | SQ | Sequence containing exactly one item | ALWAYS | AUTO |
| >> Referenced SOP Class UID | (0008,1150) | UI | Uniquely identifies the referenced SOP Class | ALWAYS | AUTO |
| >> Referenced SOP Instance UID | (0008,1155) | UI | Uniquely identifies the referenced SOP Instance | ALWAYS | AUTO |
| >Right Image Sequence | (0022,0022) | SQ | Sequence containing exactly one item | ALWAYS | AUTO |
| >> Referenced SOP Class UID | (0008,1150) | UI | Uniquely identifies the referenced SOP Class | ALWAYS | AUTO |
| >> Referenced SOP Instance UID | (0008,1155) | UI | Uniquely identifies the referenced SOP Instance | ALWAYS | AUTO |

## 7.2   Usage of Attributes from received IOD's

Not applicable.

## 7.3   Attribute Mapping

Not applicable.

## 7.4   Coerced / Modified Fields

Not applicable.

## 7.5    Data Dictionary of Private Attributes

The Private Attributes added to created SOP Instances are listed in the table below. OPTOS Suzuka software reserves blocks of private attributes in group 0021.

**Table 79: Private Data Elements of Created SOP Instances**

| Attribute Name | Tag | VR | VM | Attribute Description |
|---|---|---|---|---|
| Creator | (0021,0010) | LO | 1 | "OPTOS HEADER" |
| Proview | (0021,1000) | CS | 1 | "YES"/"NO" |
| SWL | (0021,1001) | CS | 1 | "YES"/"NO" |
| Fovea Detection Algorithm Version | (0021,1010) | LO | 1 | xxx.xx.xx |
| Fovea Location | (0021,1011) | SL | 2 | X and Y pixel coordinates |
| Fovea Confidence | (0021,1012) | FD | 1 | Between 0 and 1 |
| Optic Disc Location | (0021,1013) | SL | 2 | X and Y pixel coordinates |
| Optic Disc Confidence | (0021,1014) | FD | 1 | Greater than 0 |
| Unprojected Fovea Location | (0021,1021) | SL | 2 | X and Y pixel coordinates |
| Unprojected Optic Disc Location | (0021,1022) | SL | 2 | X and Y pixel coordinates |
| Projection Algorithm Type | (0021,1023) | CS | 1 | "FF"/"GP" |
| Projection Algorithm Table | (0021,1024) | LT | 1 | |
| Projection Algorithm Name | (0021,1025) | LT | 1 | |
| Projection Algorithm Version | (0021,1026) | LT | 1 | xxx.xx.xx |
| Sharpening Applied | (0021,1031) | CS | 1 | "YES"/"NO" |
| Sharpening Settings | (0021,1032) | DS | 4-4n | Image sharpening settings. 4 values per image channel. |
| Auto Contrast | (0021,1040) | CS | 1 | "MANUAL"/"AUTO" |
| Detector Gain | (0021,1041) | IS | 1 | Integer value greater than 0 |

| Detector Contrast | (0021,1042) | IS | 1 | Integer value greater than 0 |
|---|---|---|---|---|
| RNFL Center Coordinates | (0021,1050) | FL | 2 | X and Y pixel coordinates |
| RNFL Start Coordinates | (0021,1051) | FL | 2 | X and Y pixel coordinates |
| RNFL Scan Direction | (0021,1052) | CS | 1 | "CLOCKWISE" or "COUNTERCLOCKWISE" |
| OCT SNR Value | (0021,1060) | US | 1 | Integer value between 0 and 10 |
| OCT Blink Detected Count | (0021,1061) | SH | 1 | "n/m" where n is the number of frames in which blink was detected and m is the maximum number of frames in the scan. This field is populated if modality is OPT.<br><br>In case, where n is 0, an empty value shall be encoded. |
| OCT Movement Detected Count | (0021,1062) | SH | 1 | n/m" where n is the number of frames in which movement was detected and m is the maximum number of frames in the scan. This field is populated if modality is OPT.<br><br>In case, where n is 0, an empty value shall be encoded. |
| OCT Averages Count | (0021,1063) | SH | 1 | "n/m" where n is the number of averaged frames and m is the maximum number of frames in the scan. This field is populated if modality is OPT. |
| OCT Scan Position Error | (0021,1064) | SH | 1 | "ERROR"/"" |
| OCT Frame Location Confidence | (0021,1065) | IS | 1 | Percentage confidence in OCT frame location:<br>Integer value between 0 and 100 |
| OCT Blink Detected | (0021,1066) | SH | 1 | "WARNING"/"" |
| OCT Movement Detected | (0021,1067) | SH | 1 | "WARNING"/"" |
| OCT Fovea Location | (0021,1071) | FL | 2 | X pixel coordinate and the OCT frame number. This field is populated if the scan type is Retina. |
| OCT Segmentation Outcome | (0021,1073) | SH | 1 | "Seg Success"/"" or "Seg Fail"/"" |
| OCT Segmentation Diagnostic | (0021,1074) | SH | 1 | "n" where n is the diagnostic code. This field is populated if the segmentation analysis fails. |
| OCT Segmentation Disc Center Location | (0021,107D) | FL | 2 | Only present if segmentation analysis is enabled and the scan type is "ONH".<br><column\b-scan number> coordinates. |
| OCT Segmentation Disc 3D Location | (0021,107E) | FL | 3-3n | Multi-valued series of <column\row\b-scan number> coordinates indicating X/Y/Z of points describing the perimeter of the disc. |

| OCT Segmentation Cup 3D Location | (0021,107F) | FL | 3-3n | Multi-valued series of <column\row\b-scan number> coordinates indicating X/Y/Z of points describing the perimeter of the cup. |
|---|---|---|---|---|
| Optos Procedure Description | (0021,1093) | LO | 1 | Optional free form text to label a study e.g. "Age Related Eye Disease Study". |
| OCT Slo Reference Image | (0021,1094) | OB | 1 | Image to be supplied when details of the OCT are requested by the scanhead |
| OCT Scan Angle Degree | (0021,1095) | FL | 1 | Angle to be supplied when details of the OCT are requested by the scanhead |
| OCT Scan Center Location Pixels | (0021,1096) | SL | 1 | Location to be supplied when details of the OCT are requested by the scanhead |
| Thumbnail Image | (0021,1097) | OB | 1 | Image to be supplied when details of the OCT are requested by the scanhead |
| Unprojected Slo Image | (0021,1098) | OB | 1 | Unprojected Slo image that was used for OCT planning. |
| OCT Segmentation Retina Fovea Detection Confidence | (0021, 1099 | FL | 1 | Confidence in detection of the OCT fovea location. |
| OCT Segmentation Retina Fovea Detection Outcome | (0021,109A) | SH | 1 | "Fovea Found"/"" or "Fovea Not Found"/"" |

## 7.6    Coded terminology and Templates

Not Applicable.


## 7.7    Grayscale Image Consistency

Not applicable.


## 7.8    Standard/Extended/Specialized/Private SOP Classes

The product provides Standard Extended Conformance to all supported SOP Classes, through the inclusion of additional Type 3 Standard Elements and Private Data Elements.

The extensions are defined in Section 7.1.1.


## 7.9    Private Transfer Syntaxes

Not applicable