No. MIIXR0024EA

TOSHIBA

DICOM CONFORMANCE STATEMENT

FOR

TOSHIBA DIGITAL RADIOGRAPHY SYSTEM

Infinix Celeve-i series / Infinix-i series

Model XIDF-3DP801

AND

ANGIO WORKSTATION

Model XIDF-AWS801

TOSHIBA MEDICAL SYSTEMS CORPORATION

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1. CONFORMANCE STATEMENT OVERVIEW

Table 1-1 provides an overview of the network services supported by XIDF-3DP801, XIDF-AWS801 and XIDF-AWS801/S1. This corresponds since software version V4.50.

Table 1-1
NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
CT Image Storage	No	Yes*[1]
Enhanced CT Image Storage	No	Yes*[1]

*[1]:Option (Both XIDF-3DP802 and XIDF-3DP803)

(XIDF-3DP802 and XIDF-3DP803):Option Model Name

2. TABLE OF CONTENTS

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3. INTRODUCTION

3.1 AUDIENCE

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

3.2 REMARKS

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Toshiba Medical Systems and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

— The comparison of different conformance statements is the first step towards assessing interconnectivity between Toshiba Medical Systems and non- Toshiba Medical Systems equipment.

— Test procedures should be defined to validate the desired level of connectivity.

— The DICOM standard will evolve to meet the users' future requirements. Toshiba Medical Systems is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

3.3 DEFINITIONS, TERMS AND ABBREVIATIONS

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Abbreviations and terms are as follows:

AE	Application Entity
AET	Application Entity Title
ASCE	Association Control Service Element
CD-R	Compact Disk Recordable
DIMSE	DICOM Message Service Element
DVD	A trademark of the DVD forum that is not an abbreviation
DVD-R	DVD Recordable
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
IE	Information Entity
IOD	Information Object Definition
MPPS	Modality Performed Procedure Step
MSPS	Modality Scheduled Procedure Step
MWM	Modality Worklist Management
R	Required Key Attribute
O	Optional Key Attribute
PDU	Protocol Data Unit
SCU	Service Class User (DICOM client)
SCP	Service Class Provider (DICOM server)
SOP	Service-Object Pair
U	Unique Key Attribute
UID	Unique Identifier

3.4 REFERENCES

[DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.16, 2009

4. NETWORKING

4.1 IMPLEMENTATION MODEL

4.1.1 Application Data Flow

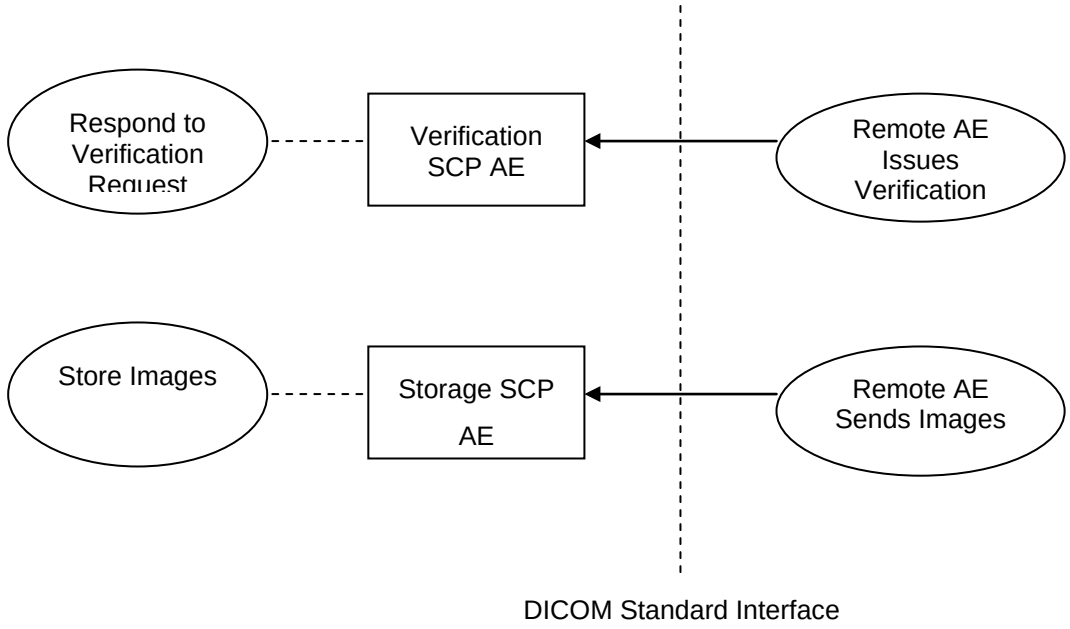

Figure 4.1-1
APPLICATION DATA FLOW DIAGRAM

— The Verification SCP AE responds successfully to C-ECHO requests. It is associated with the local real-world activity “Respond to Verification Request”

— The Storage SCP AE receives incoming images. It is associated with the local real-world activity “Store Images”. “Store Images” stores the received images to the local application.

4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of Verification SCP AE

The Verification SCP AE responds successfully to C-ECHO requests.

4.1.2.2 Functional Definition of Storage SCP AE

The Storage SCP AE waits for another application to connect at the presentation address configured for its AE Title. The Storage SCP AE will accept associations with Presentation Contexts for SOP Classes of the Storage Service Classes.

4.2 AE SPECIFICATIONS

4.2.1 Verification SCP AE Specification

4.2.1.1 SOP Classes

The Verification SCP AE provides Standard Conformance to the following SOP Classes:

Table 4.2-1
SOP CLASSES FOR THE VERIFICATION SCP AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes

4.2.1.2 Association Policies

4.2.1.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

Table 4.2-2
DICOM APPLICATION CONTEXT FOR THE VERIFICATION SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

Table 4.2-3
NUMBER OF ASSOCIATIONS ACCEPTED FOR THE VERIFICATION SCP AE

Maximum number of simultaneous associations	Unlimited

4.2.1.2.3 Asynchronous Nature

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

Table 4.2-4
ASYNCHRONOUS NATURE FOR THE VERIFICATION SCP AE

Maximum number of outstanding asynchronous transactions	1

4.2.1.2.4 Implementation Identifying Information

The implementation information for the Verification SCP AE is:

Table 4.2-5
DICOM IMPLEMENTATION CLASS FOR THE VERIFICATION SCP AE

Implementation Class UID	2.16.124.113543.6003.1999.12.20.12.5.0

4.2.1.3 Association Initiation Policy

The Verification SCP AE does not initiate associations.

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity – Respond to Verification Request

4.2.1.4.1.1 Description and Sequencing of Activities

When the Verification SCP AE accepts an association, it will respond to a verification request (C-ECHO).

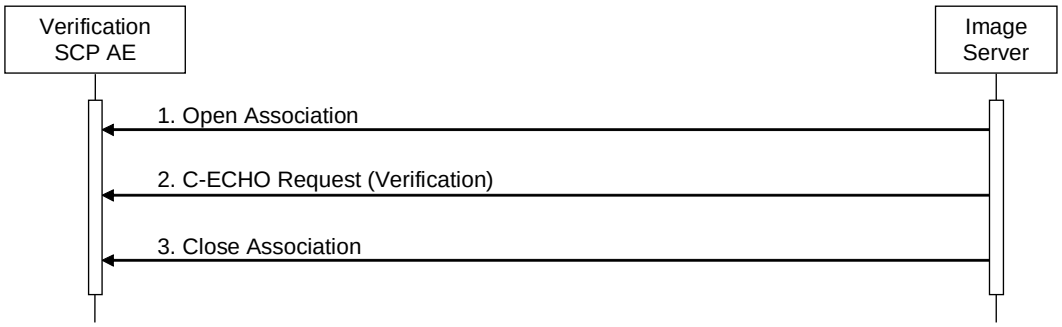

Figure 4.2-1
SEQUENCING OF ACTIVITY – RESPOND TO VERIFICATION REQUEST

A possible sequence of interactions between the Verification SCP AE and an Image Server (e.g. a storage or archive device supporting the Verification SOP Classes as an SCU) is illustrated in the Figure above:

1. The Image Server opens an association with the Verification SCP AE.
2. The Image Server issues a verification request (C-ECHO) and the Verification SCP AE replies with a C-ECHO response (status success).
3. The Image Server closes the association with the Verification SCP AE.

The Verification SCP AE may reject association attempts as shown in the table below. The Result, Source and Reason/Diag columns represent the values returned in the appropriate fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The contents of the Source column is abbreviated to save space and the meaning of the abbreviations are:

Table 4.2-6
ASSOCIATION REJECTION REASONS

Result	Source	Reason/Diag	Explanation
1 – rejected-permanent	DICOM UL service-user	3 – calling-AE-title-not-recognized	The association request contained an unrecognized calling AE Title. An association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the association acceptor has not been configured to recognize the AE Title of the association initiator.
1 – rejected-permanent	DICOM UL service-provider (ASCE related function)	1 – no-reason-given	The association request could not be parsed. An association request with the same format will not succeed at a later time.

4.2.1.4.1.2 Accepted Presentation Contexts

The default behavior of the Verification SCP AE supports the Explicit VR Little Endian transfer syntaxes.

Table 4.2-7
PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY RESPOND TO VERIFICATION REQUEST

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

4.2.1.4.1.3 SOP Specific Conformance for Verification SOP Class

The Verification SCP AE provides standard conformance to the Verification Service Class as an SCP.

4.2.2 Storage SCP AE Specification

4.2.2.1 SOP Classes

The Storage SCP AE provides Standard Conformance to the following SOP Classes:

Table 4.2-8
SOP CLASSES FOR THE STORAGE SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes

4.2.2.2 Association Policies

4.2.2.2.1 General

The DICOM standard application context name for DICOM 3.0 is always accepted:

Table 4.2-9
DICOM APPLICATION CONTEXT FOR THE STORAGE SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2 Number of Associations

The Storage SCP AE can support up to one Association at a time.

Table 4.2-10
NUMBER OF ASSOCIATIONS ACCEPTED FOR THE STORAGE SCP AE

Maximum number of simultaneous Associations	1

4.2.2.2.3 Asynchronous Nature

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

Table 4.2-11
ASYNCHRONOUS NATURE FOR THE STORAGE SCP AE

Maximum number of outstanding asynchronous transactions	1

4.2.2.2.4 Implementation Identifying Information

The implementation information for the Storage SCP AE is:

Table 4.2-12
DICOM IMPLEMENTATION CLASS AND VERSION FOR THE STORAGE SCP AE

Implementation Class UID	2.16.124.113543.6003.1999.12.20.12.5.0

4.2.2.3 Association Initiation Policy

The Storage SCP AE does not initiate Associations.

4.2.2.4 Association Acceptance Policy

The Storage SCP AE accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted then the Association Request itself is rejected. It can be configured to only accept Associations with certain hosts (using TCP/IP address) and/or Application Entity Titles.

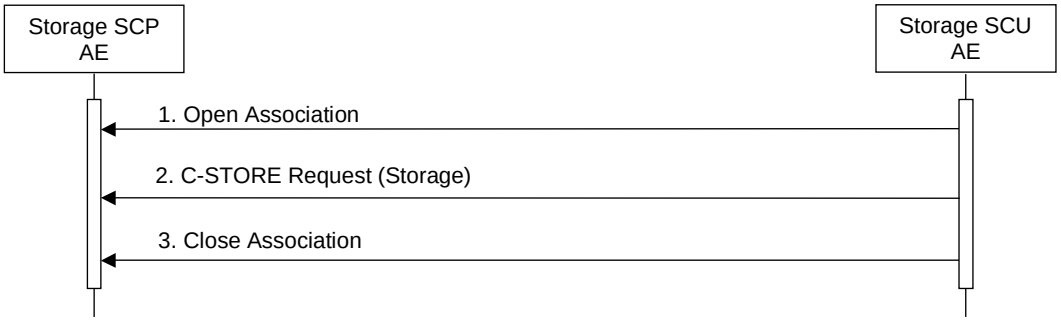

Figure 4.2-2
SEQUENCING OF ACTIVITY – STORE IMAGES TO THE LOCAL FILE SYSTEM

A possible sequence of interactions between the Storage SCP AE and a Storage SCU AE is illustrated in the Figure above:

1. The Storage SCU AE opens an Association with the Storage SCP AE.
2. The Storage SCU AE sends images to the Storage SCP AE using a Storage request (C-STORE) and the Storage SCP AE replies with a C-STORE response (status success).
3. The Storage SCU AE closes the Association with the Storage SCP AE.

The Storage SCP AE may reject Association attempts as shown in the Table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The following abbreviations are used in the Source column:

1 – DICOM UL service-user

2 – DICOM UL service-provider (ASCE related function)

3 – DICOM UL service-provider (Presentation related function)

Table 4.2-13
ASSOCIATION REJECTION REASONS

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
2 – rejected-transient	c	1 – temporary-congestion	No Associations can be accepted at this time due to the real-time requirements of higher priority activities (e.g. during image acquisition no Associations will be accepted) or because insufficient resources are available (e.g. memory, processes, threads). An Association request with the same parameters may succeed at a later time.
1 – rejected-permanent	a	2 – application-context-name-not-supported	The Association request contained an unsupported Application Context Name. An association request with the same parameters will not succeed at a later time.
1 – rejected-permanent	a	7 – called-AE-title-not-recognized	The Association request contained an unrecognized Called AE Title. An Association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the Association initiator is incorrectly configured and attempts to address the Association acceptor using the wrong AE Title.
1 – rejected-permanent	a	3 – calling-AE-title-not-recognized	The Association request contained an unrecognized Calling AE Title. An Association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the Association acceptor has not been configured to recognize the AE Title of the Association initiator.
1 – rejected-permanent	b	1 – no-reason-given	The Association request could not be parsed. An Association request with the same format will not succeed at a later time.

4.2.2.4.1.1 Accepted Presentation Contexts

The default Behavior of the Storage SCP AE supports the Explicit VR Little Endian Transfer Syntaxes.

Any of the Presentation Contexts shown in the following table are acceptable to the Storage SCP AE.

Table 4.2-14
ACCEPTED PRESENTATION CONTEXTS BY THE STORAGE SCP AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

4.2.2.4.1.2 SOP Specific Conformance for Verification SOP Class

The Storage SCP AE provides standard conformance to the Verification SOP Class as an SCP.

4.2.2.4.1.3 SOP Specific Conformance for Storage SOP Classes

The associated Activity with the Storage service is the storage of medical image data received over the network on a designated hard disk. The Storage SCP AE will return a failure status if it is unable to store the images.

The Storage SCP AE is Level 0 conformant as a Storage SCP.

Table 4.2-15
THE STORAGE SCP AE C-STORE RESPONSE STATUS RETURN REASONS

Service Status	Further Meaning	Status Code	Reason
Success	Success	0000	The Composite SOP Instance was successfully received, verified, and stored in the system database.
Refused	Out of Resources	A700H	Indicates that there was not enough local resources.
Error	Data Set does not match SOP Class	A900H	Indicates that the Data Set does not encode a valid instance of the SOP Class specified.
	Cannot understand	C000H	Indicates that the Storage SCP AE cannot parse the Data Set into Elements.

4.3 NETWORK INTERFACES

4.3.1 Physical Network Interface

This Product supports a single network interface. One of the following physical network interfaces will be available depending on installed hardware options:

Table 4.3-1
SUPPORTED PHYSICAL NETWORK INTERFACES

Ethernet 1000baseT
Ethernet 100baseT
Ethernet 10baseT

4.3.2 Additional Protocols

None.

4.4 CONFIGURATION

4.4.1 AE Title/Presentation Address Mapping

4.4.1.1 Local AE Titles

The local application uses the AE Title and TCP/IP Port configured via the Service/Installation Tool. The Field Service Engineer can configure the AE Title and the TCP Port via the Service/Installation Tool.

Table 4.4-1
AE TITLE CONFIGURATION TABLE

Application Entity	Default AE Title	Default TCP/IP Port
Verification SCP	3DRMDICOM	9009
Storage SCP		

4.4.1.2 Remote AE Title/Presentation Address Mapping

The AE Titles, host names and port numbers of remote applications are not configured.

4.4.2 Parameters

A large number of parameters related to acquisition and general operation can be configured using the Service/Installation Tool. The Table below only shows those configuration parameters relevant to DICOM communication. See the Product's Service Manual for details on general configuration capabilities.

Table 4.4-2
CONFIGURATION PARAMETERS TABLE

Parameter	Configurable (Yes/No) [Range]	Default Value
General Parameters		
Maximum PDU Receive Size	No	32 KBytes
Time-out waiting for a acceptance or rejection response to an Association Request (Application Level Timeout)	No	300 sec
Time-out waiting for a response to an Association release request (Application Level Timeout)	No	300 sec
Time-out waiting for completion of a TCP/IP connect request (Low-level timeout)	No	300 sec
Time-out awaiting a Response to a DIMSE Request (Low-Level Timeout)	No	300 sec
Time-out for waiting for data between TCP/IP-packets (Low Level Timeout)	No	300 sec
Storage SCP parameters		
Maximum number of simultaneously accepted Associations by the Storage SCP AE	No	1

5. MEDIA INTERCHANGE

Media interchange is not applicable to this product.

6. SUPPORT OF CHARACTER SETS

This product supports the following character sets:

- ISO-IR 6 (default) ISO 646
- ISO-IR 87 (Japanese) JIS X 0208 (Kanji)
- ISO-IR 159 (Japanese) JIS X 0212 (Supplementary Kanji)

Character sets ISO-IR 87 and ISO-IR 159 can be set to the tags listed in the Table below;

Table 6.1-1
Tag lists for ISO-IR 87/159

Attribute Name	Tag	VR
Patient's Name	(0010,0010)	PN

Note:

If the Storage SCP AE receives images that contain characters from unsupported character sets, it will respond with "Cannot understand" to the C-STORE request.

7. SECURTIY

This product does not support any specific security measures.

It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

a. Firewall or router protections to ensure that only approved external hosts have network access to the product.

b. Firewall or router protections to ensure that the product only has network access to approved external hosts and services.

c. Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

8. ANNEXES

8.1 IOD CONTENTS

8.1.1 Strage-SCP AE Element Use

The following Elements of Composite SOP Instance received by the STORAGE-SCP AE are used in the local application.

Table 8.1-1
SUPPORTED COMPOSITE IMAGE SOP CLASSES FOR DISPLAY

CT Image Storage
Enhanced CT Image Storage

Table 8.1-2
SIGNIFICANT ELEMENTS IN RECEIVED COMPOSITE SOP INSTANCES

Module	Attribute Name	Tag ID	Type	Significance
Patient	Patient's Name	(0010,0010)	Opt	This is displayed in the local application if exists.
	Patient ID	(0010,0020)	Mand	Must be provided.
	Patient's Birth Date	(0010,0030)	Opt	This is displayed in the local application if exists.
	Patient's Sex	(0010,0040)	Opt	This is displayed in the local application if exists.
Patient Study	Patient's Age	(0010,1010)	Opt	This is displayed in the local application if exists.
General Study	Study Instance UID	(0020,000D)	Mand	Must be provided.
	Study ID	(0020,0010)	Opt	This is displayed in the local application if exists.
	Study Date	(0020,0020)	Opt	This is displayed in the local application if exists.
General Series	Series Instance UID	(0020,000E)	Mand	Must be provided.
	Patient Position	(0018,5100)	Mand	Must be provided.
SOP Common	SOP Instance UID	(0008,0018)	Mand	Must be provided.
Image Plane	Pixel Spacing	(0028,0030)	Mand	Must be provided.
	Image Orientation (Patient)	(0020,0037)	Mand	Must be provided.
	Image Position (Patient)	(0020,0032)	Mand	Must be provided.
Image Pixel	Rows	(0028,0010)	Mand	Must be provided.
	Columns	(0028,0011)	Mand	Must be provided.
	Bits Allocated	(0028,0100)	Mand	Must be provided.
	Bits Stored	(0028,0101)	Mand	Must be provided.
	High Bit	(0028,0102)	Mand	Must be provided.

	Pixel Representation	(0028,0103)	Mand	Must be provided.
	Pixel Data	(7FE0,0010)	Mand	Must be provided.
Multi-Frame	Number of Frames	(0028,0008)	Mand	Must be provided in Enhanced CT Image case.
Multi-Frame Functional Groups	Shared Functional Groups Sequence	(5200,9229)	Mand	Must be provided in Enhanced CT Image case.
	Per-frame Functional Groups Sequence	(5200,9230)	Mand	Must be provided in Enhanced CT Image case.
CT Image	Photometric Interpretation	(0028,0004)	Mand	Must be provided in Enhanced CT Image case.
	Rescale Intercept	(0028,1052)	Opt	This value is used if exists.
	Rescale Slope	(0028,1053)	Opt	This value is used if exists.
Common CT/MR Image	Volumetric Properties	(0008,9206)	Mand	Must be provided in Enhanced CT Image case.

8.2 DATA DICTIONARY OF PRIVATE ATTRIBUTES

Not applicable to this product.

8.3 CONTROLLED TERMINOLOGY AND TEMPLATES

Not applicable to this product.

8.4 GRAYSCALE IMAGE CONSISTENCY

Not applicable to this product.

8.5 STANDARD EXTENDED/SPECIALIZED/PRIVATE SOP CLASSES

Not applicable to this product.

8.6 PRIVATE TRANSFER SYNTAXES

Not applicable to this product.