TOSHIBA

No. MIINM0003EA

CONFORMANCE STATEMENT

FOR NUCLEAR MEDICINE EQUIPMENT

GCA SOFTWARE

FOR

DICOM TRANSFER SOFTWARE

MODEL NSDC-020A

(MIINM0003EA)

TOSHIBA CORPORATION

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Table of Contents

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1. Introduction

This document is a DICOM Conformance Statement for Toshiba's Nuclear Medicine System (hereafter referred to as “the NM System”), and the applicable models covered by this document are described in Table 3, Table 8. It is intended to provide the reader with the knowledge of how to integrate this product within a DICOM compliant hospital network. It details the DICOM Service Classes, Information Objects, and Communication Protocols which are supported by this product.

If the reader is unfamiliar with DICOM, it is recommended that they read the DICOM Specification (referenced below) prior to reading this conformance statement. Also note that this document is formatted according to the DICOM Specification, Part 2: Conformance.

1.1 References

ACR-NEMA Digital Imaging and Communications in Medicine, DICOM V3.0.

1.2 Definitions

- **Association Establishment** - An Association Establishment is the first phase of communication between two DICOM Application Entities. The AEs use the Association Establishment to negotiate how data will be encoded and the type of data to be exchanged.

- **Called Application Entity Title** - The Called AE Title defines the intended receiver of an Association.

- **Calling Application Entity Title** - The Calling AE Title defines the requestor of an Association.

- **DICOM Message Service Element (DIMSE)** - A DIMSE defines the services and protocols utilized by an Application Entity to exchange messages.

- **Information Object Definition (IOD)** - An IOD is a data model which is an abstraction of real-world information. This data model defines the nature and attributes relevant to the class of real-world objects represented.

- **Service Class Provider (SCP)** - A Service Class Provider plays the "server" role to perform operations and invoke notifications during an Association. An example of a Storage Service Class Provider would be an image storage device. In this case, the image storage device is storing the image that was sent by a Service Class User.

- **Service Class User (SCU)** - A Service Class User plays the "client" role to invoke operations and perform notifications during an Association. An example of a Storage Service Class User would be an image acquisition device. In this case, the image acquisition device will create and send a DICOM image by requesting that a Service Class Provider store that image.

- **Service/Object Pair (SOP) Class** - A SOP Class is defined by the union of an Information Object Definition and a set of DIMSE Services. A DICOM Application Entity may support one or more SOP Classes. Each SOP Class is uniquely identified by a SOP Class UID.

- **SOP Instance** - A specific occurrence of a Information Object

- **Transfer Syntax** - The Transfer Syntax is a set of encoding rules that allow DICOM Application Entities to negotiate the encoding techniques (e.g. data element structure, byte ordering, compression) they are able to support. The Transfer Syntax is negotiated during Association Negotiation.

- **Unique Identifier (UID)** - A Unique Identifier is a globally unique, ISO compliant, ASCII-numeric string. It guarantees uniqueness across multiple countries, sites, vendors and equipment.

1.3 Acronyms, Abbreviations and Symbols

- ACC American College of Cardiology
- ACR American College of Radiology
- ASCII American Standard Code for Information Interchange
- AE Application Entity
- ANSI American National Standards Institute
- CEN TC251 Comite Europeen de Normalisation - Technical Committee 251 - Medical Informatics
- DICOM Digital Imaging and Communications in Medicine
- DIMSE DICOM Message Service Element
- DIMSE-C DICOM Message Service Element - Composite
- DIMSE-N DICOM Message Service Element - Normalized
- HIS Hospital Information System
- HL7 Health Level 7
- IE Information Entity
- IOD Information Object Definition
- ISO International Standards Organization
- JIRA Japan Industries Association of Radiological Systems
- NEMA National Electrical Manufacturers Association
- OSI Open Systems Interconnection
- PDU Protocol Data Unit
- RIS Radiology Information System
- SCP Service Class Provider
- SCU Service Class User
- SOP Service-Object Pair
- TCP/IP Transmission Control Protocol/Internet Protocol
- UID Unique Identifier

1.4 Important Note to the Reader

Where the NM System is linked to a remote DICOM device, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality.

2. Implementation Model

2.1 Application Data Flow Diagram

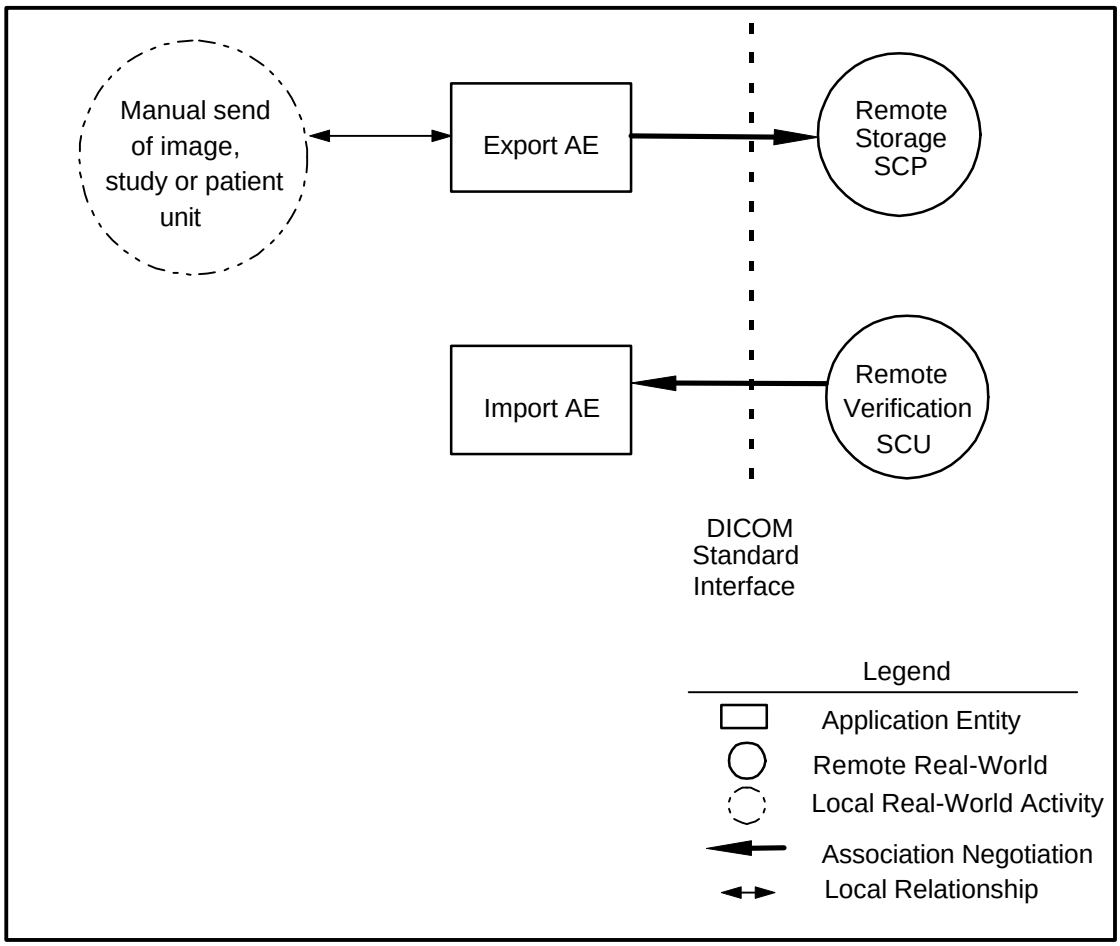

Figure 1

2.2 Functional Definitions of AE's

2.2.1 Export AE

Export AE is used to verify that a remote DICOM device is active on the network, and to transmit images to a remote DICOM device.
It therefore performs the following tasks:

- Builds DICOM NM Information Objects
- Establishes DICOM Association with remote DICOM device
- Performs storage of DICOM NM Information Objects to remote DICOM device
- Performs verification of remote DICOM device's presence on network

2.2.2 Import AE

Import AE is used to respond to requests to verify that the NM System is present and active on the network.

2.3 Sequencing of Real World Activities

2.3.1 Features

2.3.1.1 Manual Send of Image, Study or Patient Unit

- Operator requests to send data after selecting them from the Image, Study or Patient List.
- When the transfer fails, the NM System notifies the operator.

2.3.2 Operation

2.3.2.1 Manual Send of Image, Study or Patient Unit

The operation for sending data is described below:

Step-1 : Select the image, study or patient unit to be sent.

Step-2 : Select the destination of image sending.

Step-3 : Request sending.

3. AE Specifications

3.1 Export Specification

Export AE provides Standard Conformance to the following DICOM SOP Classes as an SCU:

Table 1

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
NM Image Storage	1.2.840.10008.5.1.4.1.1.20

3.1.1 Export association establishment policies

3.1.1.1 Export general

Export AE will utilize and understand the following Application Context Name:

Table 2

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

Export AE supports a minimum PDU size of 16 Kbytes and a maximum PDU size of 16 Kbytes. The default value is set to 16 Kbytes.

3.1.1.2 Export number of associations

Export AE can only establish one association at a time, independent of the number of destinations chosen.

3.1.1.3 Export asynchronous nature

Export AE allows a single outstanding operation on any association. Therefore, Export AE does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

3.1.1.4 Export implementation identifying information

Export AE will specify the following Implementation Identifying Information:

Table 3

Applicable Models	Implementation Class UID	Implementation Version Name
GMS-5500A/UI, GCA-7100A/UI, GCA-7200A/UI, GMS-5500A/PI, GCA-7100A/PI, GCA-7200A/PI	1.2.392.200036.9116.5.3.10	"TM_NM_DCM_V1.0" (indicates software version)
GMS-5500A/LA	1.2.392.200036.9116.5.2.10	"TM_NM_DCM_V1.0" (indicates software version)
GMS-5500A/DI, GCA-7100A/DI, GCA-7200A/DI	1.2.392.200036.9116.5.1.10	"TM_NM_DCM_V1.0" (indicates software version)

3.1.2 Export association initiation by real-world activity

Export AE initiates an association when the following activity is chosen by the operator:

- "Manual send of image, study or patient unit"

  - Verification : Verify that a remote DICOM device is present on the network

  - Storage : Create and store a NM image to a remote DICOM device

Verification is initiated automatically at the "Manual send of image, study or patient unit"

3.1.2.1 Export real-world activity - verification

3.1.2.1.1 Export associated real-world activity - verification

Export AE performs Verification automatically before performing an image transfer request. This feature can be turned off in the configuration, should the destination device not support the Verification Service.

3.1.2.1.2 Export proposed presentation contexts - verification

Export AE proposes the following Presentation Contexts shown below:

Table 4

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.2 Export real-world activity - storage

3.1.2.2.1 Export associated real-world activity - storage

Storage is executed by the NM System after the operator's image transfer requests are queued.

3.1.2.2.2 Export proposed presentation contexts - storage

Export AE proposes the following Presentation Contexts shown below:

Table 5

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.2.2.1 Export SOP specific conformance - NM image storage

Export AE operation involves the following sequence of steps for each image transfer.

(1) Association establishment (requestor only)

(2) Data transfer (SCU only)

(3) Association release (requestor only)

Export AE judges that the transfer of one image succeeded when the result of (2) "Data transfer" is "Success" even if the result of (3) "Association release" is "Failure".

NM Information Object Definition is described in Section 8.

3.1.3 Export association acceptance policy

Export AE does not accept any associations generated by remote applications.

3.2 Import Specification

Import AE provides Standard Conformance to the following DICOM SOP Classes as an SCP:

Table 6

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1

3.2.1 Import association establishment policies

3.2.1.1 Import general

Import AE will utilize and understand the following Application Context Name:

Table 7

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

Import AE supports a minimum PDU size of 16Kbytes and a maximum PDU size of 16Kbytes. The default value is set to 16Kbytes.

3.2.1.2 Import number of associations

Import AE supports up to three associations at a time.

3.2.1.3 Import asynchronous nature

Import AE allows a single outstanding operation on any association.
Therefore, Import AE does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

3.2.1.4 Import implementation identifying information

Import AE will specify the following Implementation Identifying Information:

Table 8

Applicable Models	Implementation Class UID	Implementation Version Name
GMS-5500A/UI, GCA-7100A/UI, GCA-7200A/UI, GMS-5500A/PI, GCA-7100A/PI, GCA-7200A/PI	1.2.392.200036.9116.5.3.10	“TM_NM_DCM_V1.0” (indicates software version)
GMS-5500A/LA	1.2.392.200036.9116.5.2.10	“TM_NM_DCM_V1.0” (indicates software version)
GMS-5500A/DI, GCA-7100A/DI, GCA-7200A/DI	1.2.392.200036.9116.5.1.10	“TM_NM_DCM_V1.0” (indicates software version)

3.2.2 Import association initiation by real-world activity

Import AE never initiates an association.

3.2.3 Import association acceptance policy

When Import AE receives an association request, it will allow the following activities to be performed during that association:

- Verification : Allow a remote DICOM device to verify that the NM System is active on the DICOM network

3.2.3.1 Import real-world activity - verification

3.2.3.1.1 Import associated real-world activity - verification

The NM System responds to Verification made by a remote Verification SCU.

3.2.3.1.2 Import presentation context table - verification

Import AE accepts all of the Presentation Contexts shown below:

Table 9

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
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

3.2.3.1.2.1 Import SOP specific conformance - verification

Import AE responds with the following status codes in response to a C-ECHO request.

Table 10

Service Status	Further Meaning	Protocol Codes	Description
Success	Success	0x0000	Operation performed properly

3.2.3.1.3 Import presentation context acceptance criterion - verification

Import AE accepts the Presentation Contexts listed in the Presentation Context Table(Table 9).

3.2.3.1.4 Import transfer syntax selection policies - verification

Import AE supports only the Implicit VR Little Endian transfer syntax. It rejects any proposed Presentation Context which does not specify the default Implicit VR Little Endian transfer syntax.

4. Communication Profiles

4.1 Supported Communication Stacks

This product provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.2 OSI Stack

Not applicable to this product.

4.3 TCP/IP Stack

This product inherits its TCP/IP stack from the computer system upon which it executes.

4.3.1 API

Not applicable to this product.

4.3.2 Physical media support

This product is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the computer system upon which it executes.

4.4 Point-to-Point Stack

Not applicable to this product.

5. Extensions/Specializations/ Privatizations

5.1 Standard/Specializations/Private SOPs

The supported NM Image Storage may be extended. The following sections describe the details for the SOP Class.

5.1.1 Standard Extended/Specialized/Private SOP - NM Image Storage

Private data elements used in this product are listed in section 8.3.

6. Configuration

For the NM System, the configuration procedure is described in the installation manual.

Note: Settings and changes are to be performed by Toshiba Service Personnel at the time of installation of the system and at anytime thereafter.

6.1 AE Title/Presentation Address Mapping

Mapping from the AE titles to the presentation addresses are as follows:

- One port number and one AE title can be described for one host name.
- Each AE title is mapped to one port number.
- Up to five remote hosts can be described.
- The NM System has following default values:

Local Port No.	104
Local AE Title	"TM_NM_DCM_V1.0" (software version)

6.2 Configurable Parameters

6.2.1 Time-out value, retry count, retry interval

The time-out value, retry count, and retry interval in each status are shown below.

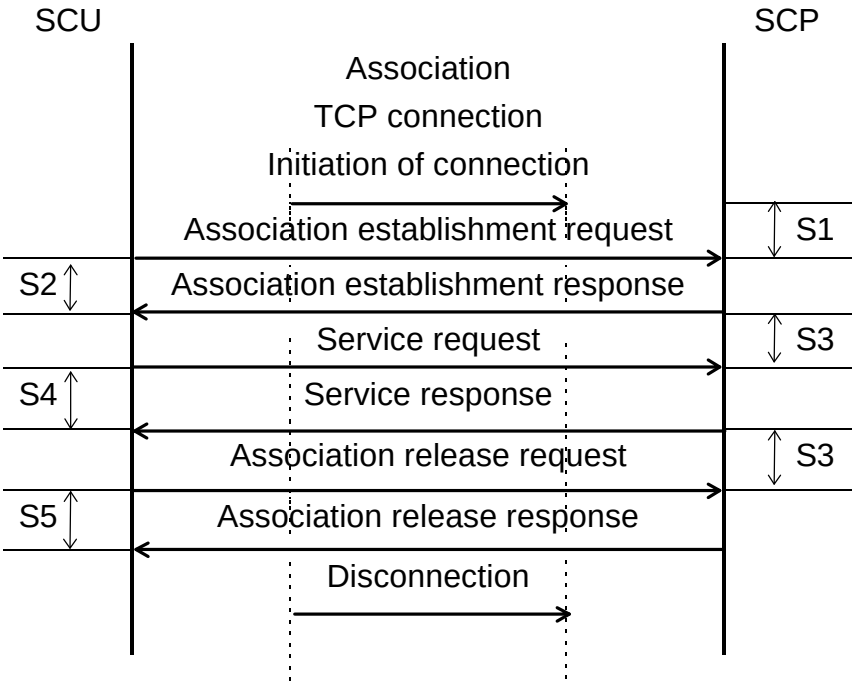

Figure 2

Table 11

Status	Item	Time-out value	Retry count	Retry interval	Remarks
S1	Association establishment request waiting time	default: 60 seconds range: 1 to 999999	Not set	Not set	Only one parameter can be set in the NM System.
S2	Association establishment response waiting time	default: 60 seconds range: 1 to 999999	default: Once range: 0 to 999999	default: 60 seconds range: 0 to 999999	Only one parameter can be set in the NM System.
S3	Service request waiting time	default: 60 seconds range: 1 to 999999	Not set	Not set	Only one parameter can be set in the NM System.
S4	Service response waiting time	default: 180 seconds range: 1 to 999999	Not set	Not set	Can be set for each provided service.
S5	Association release waiting time	default: 60 seconds range: 1 to 999999	Not set	Not set	Only one parameter can be set in the NM System.

6.2.2 Warning status criteria

The warning status criteria can be set for each station and each service, for Export AE.

6.2.2.1 NM Image Storage Response

If SUCCESS is set, the NM System judges that the image transfer succeeded.

If FAIL is set, the NM System judges that the image transfer failed.

Table 12

Warning response	Default	Parameter setting range
Coercion of Data Elements	FAIL	SUCCESS or FAIL
Data Set does not match SOP Class	FAIL	SUCCESS or FAIL
Elements discarded	FAIL	SUCCESS or FAIL

6.3 Implementation Information and Maximum Reception PDU Size

The default values for the NM System are used for the Implementation Class UID, the Implementation Version name, and the Maximum length received. They cannot be changed.

Table 13

Applicable Models	Implementation Class UID	Implementation Version Name	Maximum length received (unit: byte)
GMS-5500A/UI, GCA-7100A/UI, GCA-7200A/UI, GMS-5500A/PI, GCA-7100A/PI, GCA-7200A/PI	1.2.392.200036.9116.5.3.10	“TM_NM_DCM_V1.0” (indicates software version)	0x4000
GMS-5500A/LA	1.2.392.200036.9116.5.2.10	“TM_NM_DCM_V1.0” (indicates software version)	0x4000
GMS-5500A/DI, GCA-7100A/DI, GCA-7200A/DI	1.2.392.200036.9116.5.1.10	“TM_NM_DCM_V1.0” (indicates software version)	0x4000

6.4 Default Transfer Syntax

6.4.1 Export AE

In NM Image Storage, when two transfer syntax responses are received, the NM System performs the transfer using the following setting:

Default = "Explicit VR Big Endian"

7. Support of Extended Character Sets

This product supports the following character sets:

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

8. Information Object Definition-Storage SCU

8.1 Entity Module Definitions

The information modules for the NM System are defined below.

8.1.1 NM IOD Modules

Table 14

Information Entity	Module	Reference	Usage[1]
Patient	Patient Module	8.2.1	M
Study	General Study Module	8.2.2	M
	Patient Study Module	8.2.3	U
Series	General Series Module	8.2.4	M
	NM Series Module	8.2.5	M
Frame of Reference	Frame of Reference Module	Not used	U
Equipment	General Equipment Module	8.2.6	M
Image	General Image Module	8.2.7	M
	Image Pixel Module	8.2.8	M
	NM Image Pixel Module	8.2.9	M
	Multi-frame Module	8.2.10	M
	NM Multi-frame Module	8.2.11	M
	NM Image Module	8.2.12	M
	NM Isotope Module	8.2.13	M
	NM Detector Module	8.2.14	M
	NM TOMO Acquisition Module	8.2.15	C
	NM Multi-gated Acquisition Module	8.2.16	C
	NM Phase Module	8.2.17	C
	NM Reconstruction Module	8.2.18	C
	Overlay Plane Module	Not used	U
	Multi-frame Overlay Module	Not used	U
	Curve Module	Not used	U
	VOI LUT Module	Not used	U
	SOP Common Module	8.2.19	M

[1] M = Mandatory, C = Conditional, U = User option

8.2 Information Object Definitions

8.2.1 Patient Module

Table 15

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Always set.
Patient ID	(0010,0020)	2	Always set.
Patient's Birth Date	(0010,0030)	2	Length=0 when no entry is made.
Patient’s Sex	(0010,0040)	2	Length=0 when no entry is made. (“M”, “F”, “O”)
Patient Comments	(0010,4000)	3	Not set when no entry is made.

8.2.2 General Study Module

Table 16

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Always set.
Study Date	(0008,0020)	2	Always set.
Study Time	(0008,0030)	2	Always set.
Referring Physician’s Name	(0008,0090)	2	Length=0 when no entry is made.
Study Description	(0008,1030)	3	Not set when no entry is made.

8.2.3 Patient Study Module

Table 17

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Not set when no entry is made.
Patient’s Age	(0010,1010)	3	Not set when no entry is made.

8.2.4 General Series Module

Table 18

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Always set. (“NM”)
Series Instance UID	(0020,000E)	1	Always set.
Series Date	(0008,0021)	3	Always set.
Series Time	(0008,0031)	3	Always set.

8.2.5 NM Series Module

Table 19

Attribute Name	Tag	Type	Attribute Description
Patient Gantry Relationship Code Sequence	(0054,0414)	2	Length=0 when the setting conditions are not met, or when no entry is made.
>Code Value	(0008,0100)	1C	Always set when the sequence is set.
>Coding Scheme Designator	(0008,0102)	1C	Always set when the sequence is set. (“99SDM”)
>Code Meaning	(0008,0104)	3	Not set when the sequence is not set, or when no entry is made.

8.2.6 General Equipment Module

Table 20

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Always set. (“TOSHIBA_MEC”)
Institution Name	(0008,0080)	3	Not set when no entry is made.
Manufacturer’s Model Name	(0008,1090)	3	Always set.
Device Serial Number	(0018,1000)	3	Always set.

8.2.7 General Image Module

Table 21

Attribute Name	Tag	Type	Attribute Description
Patient Orientation	(0020,0020)	2C	Length=0 when no entry is made. (“R\P”, “L\P”)
Image Type	(0008,0008)	3	Always set. (“ORIGINAL\PRIMARY\[VALUE 3]”, where VALUE 3 is one of STATIC, DYNAMIC, GATED, WHOLEBODY, TOMO, GATED TOMO, RECON TOMO, RECON GATED TOMO)
Acquisition Date	(0008,0022)	2	Always set.
Acquisition Time	(0008,0032)	2	Always set.

8.2.8 Image Pixel Module

Table 22

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	Always set. (0x01)
Photometric Interpretation	(0028,0004)	1	Always set. (“MONOCHROME2”)
Rows	(0028,0010)	1	Always set.
Columns	(0028,0011)	1	Always set.
Bits Allocated	(0028,0100)	1	Always set. (0x10)
Bits Stored	(0028,0101)	1	Always set. (0x10)
High Bit	(0028,0102)	1	Always set. (0x0F)
Pixel Representation	(0028,0103)	1	Always set. (0x0000, 0x0001)
Pixel Data	(7FE0,0010)	1	Always set.

8.2.9 NM Image Pixel Module

Table 23

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	Always set. (0x01)
Photometric Interpretation	(0028,0004)	1	Always set. (“MONOCHROME2”)
Bits Allocated	(0028,0100)	1	Always set. (0x10)
Bits Stored	(0028,0101)	1	Always set. (0x10)
High Bit	(0028,0102)	1	Always set. (0x0F)
Pixel Spacing	(0028,0030)	2	Always set.

8.2.10 Multi-frame Module

Table 24

Attribute Name	Tag	Type	Attribute Description
Number of Frames	(0028,0008)	1	Always set.
Frame Increment Pointer	(0028,0009)	1	Always set.

8.2.11 NM Multi-frame Module

Table 25

Attribute Name	Tag	Type	Attribute Description
Frame Increment Pointer	(0028,0009)	1	Always set.
Energy Window Vector	(0054,0010)	1C	Always set when the setting conditions are met. (0x01)
Number of Energy Windows	(0054,0011)	1	Always set.
Detector Vector	(0054,0020)	1C	Always set then the setting conditions are met.
Number of Detectors	(0054,0021)	1	Always set.
Phase Vector	(0054,0030)	1C	Always set when the setting conditions are met.
Number of Phases	(0054,0031)	1C	Always set when the setting conditions are met.
Rotation Vector	(0054,0050)	1C	Always set when the setting conditions are met.
Number of Rotations	(0054,0051)	1C	Always set when the setting conditions are met.
R-R Interval Vector	(0054,0060)	1C	Always set when the setting conditions are met.
Number of R-R Intervals	(0054,0061)	1C	Always set when the setting conditions are met.
Time Slot Vector	(0054,0070)	1C	Always set when the setting conditions are met.
Number of Time Slots	(0054,0071)	1C	Always set when the setting conditions are met.
Slice Vector	(0054,0080)	1C	Always set when the setting conditions are met.
Number of Slices	(0054,0081)	1C	Always set when the setting conditions are met.
Angular View Vector	(0054,0090)	1C	Always set when the setting conditions are met.
Time Slice Vector	(0054,0100)	1C	Always set when the setting conditions are met.

8.2.12 NM Image Module

Table 26

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	Always set. ("ORIGINAL\PRIMARY\[VALUE 3]", where VALUE 3 is one of STATIC, DYNAMIC, GATED, WHOLEBODY, TOMO, GATED TOMO, RECON TOMO, RECON GATED TOMO)
Counts Accumulated	(0018,0070)	2	Always set.
Acquisition Termination Condition	(0018,0071)	3	Not set when no entry is made. ("CNTS", "MANU", "TIME", "TRIG")
Actual Frame Duration	(0018,1242)	1C	Always set when the setting conditions are met.
Corrected Image	(0028,0051)	3	Not set when no entry is made. ("ATTN", "SCAT", "UNIF")
Whole Body Technique	(0018,1301)	3	Always set when the setting conditions are met. ("1PS", "2PS")
Scan Velocity	(0018,1300)	2C	Always set when the setting conditions are met.
Scan Length	(0054,1302)	2C	Always set when the setting conditions are met.
Trigger Source or Type	(0018,1061)	3	Always set when the setting conditions are met. ("EKG")
Anatomic region Sequence	(0008,2218)	3	Not set when no entry is made.
>Code Value	(0008,0100)	1C	Always set when the sequence is set.
>Coding Scheme Designator	(0008,0102)	1C	Always set when the sequence is set. ("99SDM")
>Code Meaning	(0008,0104)	3	Always set when the sequence is set.

8.2.13 NM Isotope Module

Table 27

Attribute Name	Tag	Type	Attribute Description
Energy Window Information Sequence	(0054,0012)	2	Not set when no entry is made.
>Energy Window Name	(0054,0018)	3	Not set when no entry is made.
>Energy Window Range Sequence	(0054,0013)	3	Not set when no entry is made.
>>Energy Window Lower Limit	(0054,0014)	3	Not set when no entry is made.
>>Energy Window Upper Limit	(0054,0015)	3	Not set when no entry is made.
Radiopharmaceutical Information Sequence	(0054,0016)	2	Length=0 when no entry is made
>Radionuclide Code Sequence	(0054,0300)	2C	Always set if the sequence is set.
>>Code Value	(0008,0100)	1C	Always set if the sequence is set.
>>Coding Scheme Designator	(0008,0102)	1C	Always set if the sequence is set.
>>Code Meaning	(0008,0104)	3	Always set when the sequence is set. (“99SDM”)
>Radionuclide Total Dose	(0018,1074)	3	Not set when no entry is made.

8.2.14 NM Detector Module

Table 28

Attribute Name	Tag	Type	Attribute Description
Detector Information Sequence	(0054,0022)	2	Always set.
>Collimator/grid Name	(0018,1180)	3	Always set.
>Collimator Type	(0018,1181)	2C	Always set. (“FANB”, “PARA”, “UNKNOWN”)
>Field of View Shape	(0018,1147)	3	Not set when no entry is made. (“RECTANGLE”, “ROUND”)
>Image Orientation (Patient)	(0020,0037)	2C	Always set when the setting conditions are met.
>Image Position (Patient)	(0020,0032)	2C	Length=0 when no entry is made.

8.2.15 NM TOMO Acquisition Module

This module is set only when Image Type (0008,0008), Value 3, is TOMO, GATED TOMO, RECON TOMO, or RECON GATED TOMO.

Table 29

Attribute Name	Tag	Type	Attribute Description
Rotation Information Sequence	(0054,0052)	2	Always set.
>Start Angle	(0054,0200)	1C	Always set if the sequence is set.
>Angular Step	(0018,1144)	1C	Always set if the sequence is set.
>Rotation Direction	(0018,1140)	1C	Always set if the sequence is set.
>Scan Arc	(0018,1143)	1C	Always set if the sequence is set. (“120”, “180”, “360”)
>Actual Frame Duration	(0018,1242)	1C	Always set if the sequence is set.
>Number of Frames in Rotation	(0054,0053)	1C	Always set if the sequence is set.
>Table Traverse	(0018,1131)	3	Not set when no entry is made.
Type of Detector Motion	(0054,0202)	3	Always set. (“CONTINUOUS”, “STEP AND SHOOT”)

8.2.16 NM Multi-gated Acquisition Module

This module is set when Image Type (0008,0008), Value 3, is GATED, GATED TOMO, or RECON GATED TOMO.

Table 30

Attribute Name	Tag	Type	Attribute Description
Beat Rejection Flag	(0018,1080)	3	Always set.
Gated Information Sequence	(0054,0062)	2C	Length=0 when there is no description of the Data Information Sequence.
>Data Information Sequence	(0054,0063)	2C	Length=0 when there is no description of the Frame Time.
>>Frame Time	(0018,1063)	1C	Always set when the sequence is set.
>>Nominal Interval	(0018,1062)	3	Always set when the sequence is set.
>>Intervals Acquired	(0018,1083)	3	Not set when no entry is made.
>>Time Slot Information Sequence	(0054,0072)	2C	Length=0 when no entry is made.
>>>Time Slot Time	(0054,0073)	3	Not set when no entry is made.

8.2.17 NM Phase Module

This module is set when Image Type (0008,0008), Value 3, is DYNAMIC.

Table 31

Attribute Name	Tag	Type	Attribute Description
Phase Information Sequence	(0054,0032)	2C	Always set.
>Phase Delay	(0054,0036)	1C	Always set if the sequence is set.
>Actual Frame Duration	(0018,1242)	1C	Always set if the sequence is set.
>Pause Between Frames	(0054,0038)	1C	Always set if the sequence is set.
>Number of Frames in Phase	(0054,0033)	1C	Always set if the sequence is set.
>Number of Triggers in Phase	(0054,0211)	1C	Always set if the sequence is set.

8.2.18 NM Reconstruction Module

This module is set when Image Type (0008,0008), Value 3, is RECON TOMO or RECON GATED TOMO.

Table 32

Attribute Name	Tag	Type	Attribute Description
Spacing Between Slices	(0018,0088)	2	Always set.
Convolution Kernel	(0018,1210)	3	Always set.
Slice Thickness	(0018,0050)	2	Always set.

8.2.19 SOP Common Module

Table 33

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	2	Always set.
SOP Instance UID	(0008,0018)	2	Always set.
Instance Creation Date	(0008,0012)	3	Always set.
Instance Creation Time	(0008,0013)	3	Always set.
Instance Creator UID	(0008,0014)	3	Always set.
Specific Character Set	(0008,0005)	1C	Always set when the setting conditions are met.

8.3 Private Data Elements

Private data elements for the NM System are defined below.

Table 34

Attribute Name	Tag	Type	VR	VM	Attribute Description
Private Creator	(0009,00XX)	3	LO	1	“TOSHIBA_MEC_OT3”
HIS/RIS Study ID	(0009,XX00)	3	LO	1	Not set when no entry is made.