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6 **Digital Imaging and Communications in Medicine (DICOM)**

7 *Supplement 124: Communication of Display Parameters*

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Table of Contents

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80   **Scope and Field of Application**

81   This Supplement defines the Display System Management Service.

82   Medical image quality and display quality control are system-wide challenges involving multiple devices. In
83   particular, it is necessary to continually track image quality performance factors of output devices, including
84   PACS softcopy and hardcopy output and modality consoles. Applications need ways to retrieve the
85   characteristics of the output devices on which they will display images; specifically, the level of conformance
86   to GSDF and the actual display function of the display device.

87   This Supplement defines a Display System Information Object and SOP Class allowing retrieval of
88   standardized display system characteristics and performance information including image quality factors.

89   Color display is not addressed in this supplement.

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91

92   **Part 3**

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93 | **Add to Section 2 Normative references:**

94 **INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO) AND INTERNATIONAL**
95 **ELECTROTECHNICAL COMMISSION (IEC)**

96 …

97 **IEC 61966-2-1 ed1.0**   **Multimedia systems and equipment – Colour**
98   **measurement and management – part 2-1:Colour**
99   **management – Default RGB colour space – sRGB**

100 **…**

101 **IEC 62563-1 Ed. 1.0 2009**   **Medical Electrical Equipment – Medical image**
102   **display systems Part 1: Evaluation methods**

103 **…**

104 **ISO 11664-4/CIE S 014-4**   **Colorimetry-part 4: CIE 1976 L*a*b* colour space**

105 …

106 **OTHER REFERENCES**

107 …

108 **AAPM ON-LINE REPORT NO.03: 2005   ASSESSMENT OF DISPLAY PERFORMANCE FOR MEDICAL**
109 **IMAGING SYSTEMS**

110 **DIN6868   Image quality assurance in diagnostic X-ray departments**

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112 | **Add the following subsection to Section 3:**

113 **3.X   DISPLAY EQUIPMENT DEFINITIONS**

114 This Part of the Standard makes use of the following terms defined in PS 3.14:

115   a. Display System, as applies to emissive displays only:

116 Note: The definition is "A device or devices that accept DDLs to produce corresponding Luminance values. This
117   includes emissive displays, transmissive hardcopy viewed on light boxes, and reflective hardcopy."

118
119

120 This Part of the Standard makes use of the following term:

121 a. **Display Subsystem**: A part of a Display System. A Display Subsystem consists of one Display
122   Device and zero or more other devices (such as controllers). A Display System has one or more
123   Display Subsystems.

124 This Part of the Standard makes use of the following terms defined in IEC 62563-1 Ed. 1.0:2009:

125 a. Display Device:

126 Note: The definition is "specific hardware/medium used to display images presented through an analogue or
127   digital interface".

128 **3.Y DIGITAL INPUT VALUES TO DISPLAY SYSTEMS**

129 This Part of the Standard makes use of the following terms defined in PS 3.14:

130 a. Digital Driven Level(DDL):

131 Note: The definition is "A digital value which given as input to a Display System produces a Luminance. The set
132   of DDLs of a Display System is all the possible discrete values that can produce Luminance values on that
133   Display System. The mapping of DDLs to Luminance values for a Display System produces the
134   Characteristic Curve of that Display System. The actual output for a given DDL is specific to the Display
135   System and is not corrected for the Grayscale Standard Display Function".

136

137 **Add the following subsection to Section 7**

138 **7.X EXTENTION OF THE DICOM MODEL OF THE REAL WORLD FOR DISPLAY SYSTEM**

139 The DICOM Model of the Real World is extended for Display System with the addition of an entity that is
140 separate from the rest of the DICOM Real World objects, as shown in Figure 7.X-1a. A Display System is not
141 associated with any specific objects in the existing DICOM Information model, because it is not associated
142 with a specific patient. One Display System object is included in a Display System IOD.

143
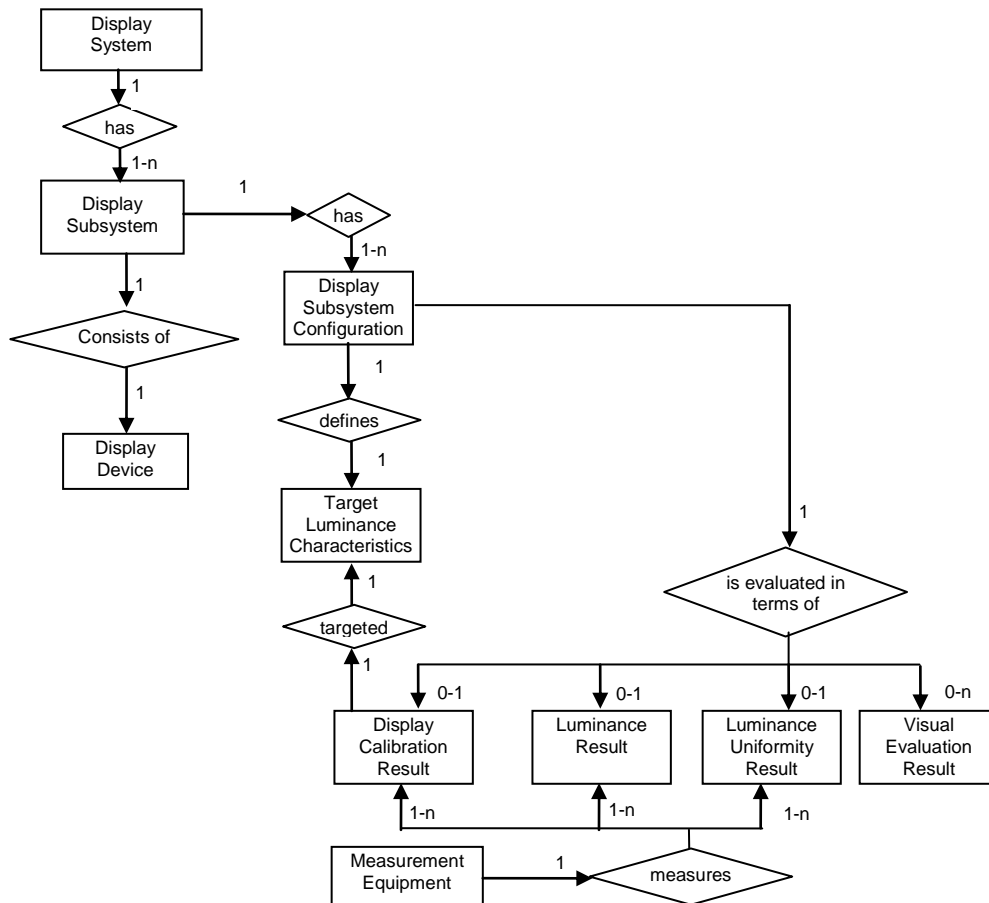
Figure 7.X-1a   DICOM Model of the Real World – Display System

A Display Subsystem represents the target of a Display QA task such as calibration. For example, a PACS reading station with one color controller driving one display, and 4 grayscale displays each driven by two controllers is modeled as 5 Display Subsystems, each of which can be the target of a Display QA task. A tablet represents one Display System with a Display Device but no externally exposed controller. Although Display Subsystem may include components beyond the Display Device, this Model focuses on the Display Device only.

151

152
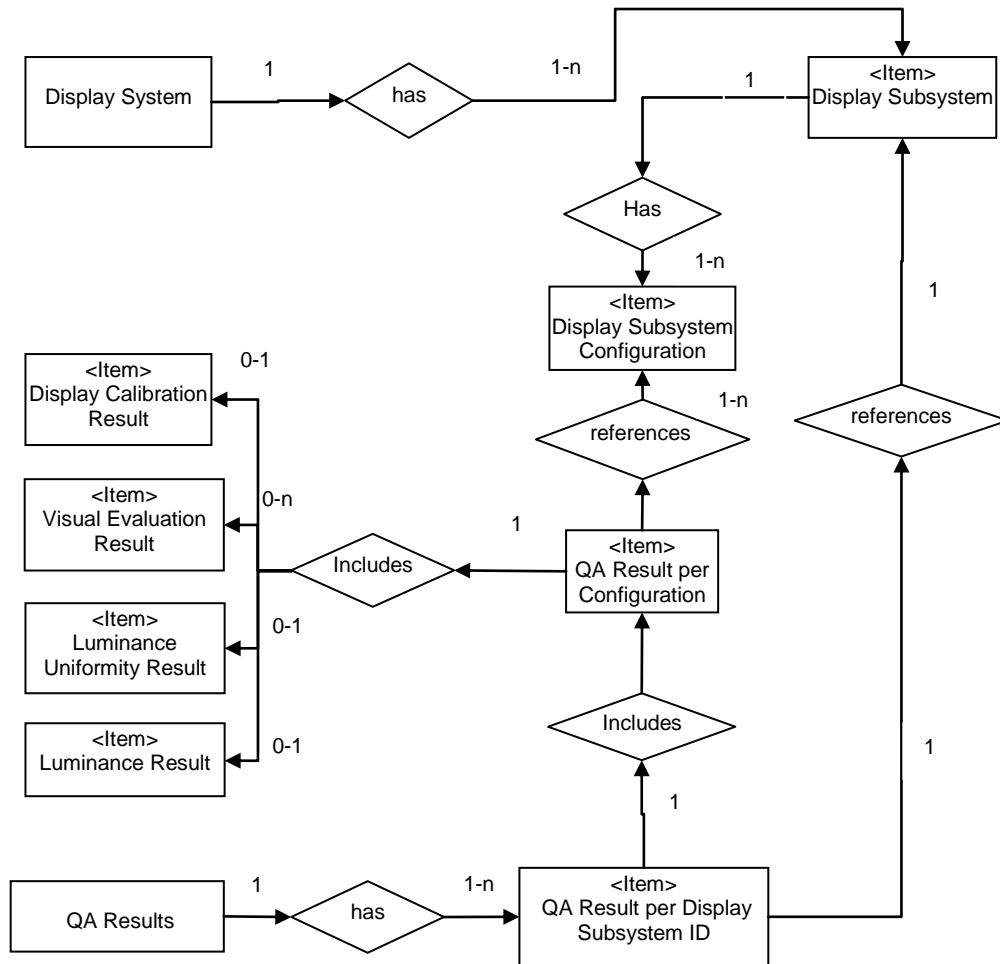
Figure 7.X-1b   Display Subsystem Composition in the Display System IOD

154 Figure 7.X-1b illustrates how the composition of Display Subsystems is represented in the Display System
155 IOD.

156

157 | **Item: Add to Annex B** |

158 **B.X   DISPLAY SYSTEM INFORMATION OBJECT DEFINITION**

159 **B.X.1   IOD Description**

160 An instance of the Display System IOD describes all of the Display Subsystems in a given Display System.

161 Display Subsystems are described in terms of their equipment identification, display performance
162 (luminance, uniformity, etc.) and the corresponding configurations. Although a variety of components
163 (controllers, cables, display devices, etc.) contribute to the performance of the Display Subsystem to which
164 they belong, these details are not exposed in the abstraction of the Display Subsystem. Similarly, each
165 Display Subsystem is addressed independently even though one controller might drive display devices in
166 multiple Display Subsystems or multiple controllers might drive a single display device. Effectively, the
167 Display Subsystem represents the display device and any components involved behind it.

168 The IOD only describes emissive display systems.

169 Note: Hanging Protocols manage *Screens* based on their physical location and arrangement. This IOD does not
170 describe the spatial positioning of Display Devices. There is usually a 1:1 relationship between a Display
171 Subsystem in this IOD and a Hanging Protocol Screen.

172 **Table B.X-1**
173 **DISPLAY SYSTEM IOD MODULES**

Module	Reference	Module Description
SOP Common	C.12.1	Contains SOP Common information.
Display System	C.X.1	Describes the Display System. The Display System has one or more Display Subsystem. A Display Subsystem corresponds to one Display Device.
Target Luminance Characteristics	C.X.2	Describes the target luminance characteristics of the Display Subsystem(s)
QA Results	C.X.3	Describes the results of QA performed on the Display Subsystem(s).

174

175 | **Item: Add to Annex C**

176 **C.X   DISPLAY SYSTEM MODULES**

177

178 **C.X.1   Display System Module**

179 This Module describes the Display System.

180   **Table C.X.1-1**
181   **DISPLAY SYSTEM MODULE ATTRIBUTES**

Attribute Name	Tag	Attribute Description
Manufacturer	(0008,0070)	Manufacturer of the Display System.
Institution Name	(0008,0080)	Institution where the Display System is located.
Institution Address	(0008,0081)	Mailing address of institution where the Display System is located.
Device Serial Number	(0018,1000)	Manufacturer's serial number of the Display System. Note: The components of the Display System may also have their own serial numbers.
Station Name	(0008,1010)	User defined name identifying the Display System.
Institutional Department Name	(0008,1040)	Department name in the institution where the Display System is located.
Manufacturer's Model Name	(0008,1090)	Manufacturer's model name of the Display System.
Equipment Administrator Sequence	(0028,7000)	Point of contact for problems with the equipment. Zero or more Items shall be included in this sequence.
>Person Name	(0040,A123)	Name of the person or role that is administrating the equipment.
>*Include 'Person Identification Macro' Table 10-1*		
Number of Display Subsystems	(0028,7001)	Number of Display Subsystems in the Display System.
Display Subsystem Sequence	(0028,7023)	Description of each Display Subsystem. One or more Items shall be included in this sequence.
>Display Subsystem ID	(0028,7003)	Number that identifies a specific display subsystem within a Display System. The value shall be unique within the Display Subsystem Sequence (0028,7023).
>Display Subsystem Name	(0028,7004)	User-defined name for the Display Subsystem.
>Display Subsystem Description	(0028,7005)	A free text description of the Display Subsystem.
>Display Device Type Code Sequence	(0028,7022)	Type of technology used in the Display Device
>>*Include 'Code Sequence Macro' Table*		Baseline CID 8303 Display Device Type

8.8-1		
>Manufacturer	(0008,0070)	Manufacturer of the Display Device in the Display Subsystem.
		If the Display Subsystem is provided integrated into the Display System (e.g. for a tablet) and the Manufacturer is not otherwise known, the Manufacturer of the Display System may be recorded here.
		Note: Each Display Subsystem is considered to have a single Display Device.
>Device Serial Number	(0018,1000)	Manufacturer's serial number of the Display Device (i.e. monitor device) in the Display Subsystem.
		If the Display Subsystem is provided integrated into the Display System (e.g. for a tablet) and the Device Serial Number is not otherwise known, the Device Serial Number of the Display System may be recorded here.
>Manufacturer's Model Name	(0008,1090)	Manufacturer's model name of the Display Device in the Display Subsystem.
		If the Display Subsystem is provided integrated into the Display System (e.g. for a tablet) and the Model Name is not otherwise known, the Model Name of the Display System may be recorded here.
>System Status	(0028,7006)	Current overall status of the Display Subsystem.
		Defined Terms:
		NORMAL
		WARNING
		ADJUST
		FAILURE
		UNKNOWN
		See C.X.1.1
>System Status Comment	(0028,7007)	A free text comment about the status of the Display Subsystem.
>Display Subsystem Configuration Sequence	(0028,700A)	Available Display Subsystem Configurations.
		One or more Items shall be included in this Sequence.
>>Configuration ID	(0028,700B)	Number that identifies a specific display subsystem configuration within the Display Subsystem Configuration Sequence (0028,700A).
		The value shall be unique within the Display Subsystem Configuration Sequence (0028,700A).
>>Configuration Name	(0028,700C)	User-defined name for the Display Subsystem Configuration.
>>Configuration Description	(0028,700D)	A free text description of the Display Subsystem Configuration.

>>Referenced Target Luminance Characteristics ID	(0028,700E)	References the intended luminance characteristics for this Configuration of this Display Subsystem.
		The value is the Luminance Characteristics ID (0028,7009) within the Target Luminance Characteristics Sequence (0028,7008) of the Luminance Characteristics Module.
>Current Configuration ID	(0028,7002)	References the current configuration of the Display Subsystem.
		The value is the Configuration ID (0028,700B) of the item in the Display Subsystem Configuration Sequence (0028,700A).
>Measurement Equipment Sequence	(0028,7012)	Describes measurement equipment (if any) built into the Display Subsystem.
		Zero or more items shall be included in this sequence.
>>Measurement Functions	(0028,7013)	Measurement functions of the measurement equipment.
		Enumerated Values:
		PHOTOMETER = measurement of light intensity
		COLORIMETER = measurement of energy along the visible spectrum
		ILLUMINOMETER = measurement of illumination (ambient luminance)
		This multivalued attribute shall contain at most one of each enumerated value. When multiple values are present, the equipment is capable of performing multiple functions.
>>Measured Characteristics	(0028,7026)	Characteristic(s) which are measured by the measurement equipment.
		Enumerated Values:
		UNIFORMITY = Luminance uniformity
		LUMINANCE = Luminance
		CHROMATICITY = Chromaticity
		ILLUMINANCE = Illuminance
		This multivalued attribute shall contain at most one of each enumerated value. When multiple values are present, the equipment is capable of measuring multiple characteristics.
>>Measurement Equipment Type	(0028,7014)	Type of measurement equipment.
		Enumerated Values:
		BUILT_IN_FRONT
		BUILT_IN_BACK
		NEAR_RANGE
		TELESCOPIC

	See C.X.1.2	
>>Manufacturer	(0008,0070)	Manufacturer of the measurement equipment.
>>Manufacturer's Model Name	(0008,1090)	Manufacturer's model name of the measurement equipment.
>>Device Serial Number	(0018,1000)	The measurement equipment serial number.
>>DateTime of Last Calibration	(0018,1202)	Date and time of the last calibration of the measurement equipment. Note: This is likely different than the date of the calibration of the Display Subsystem itself.

182

C.X.1.1 System Status

184 The meanings of the Defined Terms for System Status (0028,7006) are:

185 NORMAL Device performance is within specified limits

186 WARNING Device performance improvement/re-calibration is appropriate

187 ADJUST Correction required; may be performed by trained staff

188 FAILURE Service required

189 UNKNOWN Unable to obtain status from the device

190 It is up to the implementation how to set the System Status (0028,7006) based on the contents of the status
191 code sequences.

C.X.1.2 Measurement Equipment Type

193 The meanings of the Enumerated Values for Measurement Equipment Type (0028,7014) are:

194 BUILT_IN_FRONT The sensor is located on the front of the surface of a display device

195 BUILT_IN_BACK The sensor is located inside the display device

196 NEAR_RANGE The sensor is held at a close distance from the surface of the display device

197 TELESCOPIC The sensor is aimed toward the display device from a distance of about 1 meter

198

199 See IEC 62563-1 Ed. 1.0 2009, Annex B, section B.2.1 to B.2.4 for examples of these types.

C.X.2 Target Luminance Characteristics Module

201 This Module is a library of target luminance characteristics to be achieved in the calibration of specific
202 configurations of specific Display Subsystems.

203 **Table C.X.2-1**
204 **Target Luminance Characteristics Module Attributes**

Attribute Name	Tag	Description
Target Luminance Characteristics Sequence	(0028,7008)	Target luminance characteristics to which the Display Subsystem can be calibrated. One or more Items shall be included in this sequence.
>Luminance Characteristics ID	(0028,7009)	Number that identifies this Luminance Characteristics item. The value shall be unique within the Target Luminance Characteristics Sequence (0028,7008).

>Display Function Type	(0028,7019)	The type of Display Function used to define the target luminance curve.
		Enumerated Values:
		GSDF
		CIELAB
		GAMMA
		LINEAR
		LOG10
		SRGB
		USER_DEFINED
		See C.X.2.1
>Target Minimum Luminance	(0028,701D)	The minimum luminance value of the target luminance curve, in candelas per square meter (cd/m2).
>Target Maximum Luminance	(0028,701E)	The maximum luminance value of the target luminance curve, in candelas per square meter (cd/m2).
>Gamma Value	(0028,701A)	The Gamma value for generating the target luminance curve.
		Required if the value of Display Function Type (0028,7019) is GAMMA.
>Number of Luminance Points	(0028,701B)	The number of luminance points in the user defined target luminance curve.
		Required if the value of Display Function Type (0028,7019) is USER_DEFINED.
>Luminance Response Sequence	(0028,701C)	Luminance Response Values for the user defined target luminance curve.
		The number of Items shall match the value of Number of Luminance Points (0028,701B).
		Required if the value of Display Function Type (0028,7019) is USER_DEFINED.
>>DDL Value	(0028,7017)	The integer Digital Driving Level (DDL) for this luminance value.
		The DDL Value for the first item in the sequence shall be 0. The DDL Value of the last item in the sequence shall be the maximum DDL value. Two items in the sequence shall not have the same DDL value. The DDL Value of the items in the sequence shall increase monotonically.
>>Luminance Value	(0028,701F)	Luminance in candelas per square meter (cd/m2) corresponding to the DDL Value.
>Luminance Response Description	(0028,7020)	User defined text to describe the user defined target luminance curve.
>CIExy White Point	(0028,7018)	A single measured White Point recorded for the Display Subsystem.
		The white point is recorded as a CIE xy chromaticity

		with two dimensionless floating point values where the first is the x value and the second is the y value.
>Reflected Ambient Light	(2010,0160)	Reflected ambient light in candelas per square meter (cd/m2) when the measurements were taken.
>Ambient Light Value Source	(0028,7025)	Source of the reflected ambient light value. Enumerated Values: DEFAULT = a configured default value was used. MEASURED = the value was measured at the time of the other measurements PROVIDED = the value was provided by an external source. Required if Reflected Ambient Light (2010,0160) is present.

205

206 **C.X.2.1   Display Function Type**

207 The meanings of the Enumerated Values for Display Function Type (0028,7019) are:.

208   GSDF   Grayscale Display Function; See PS 3.14

209   CIELAB   See CIE 1976 (L*,a*,b*) and See CIELab Color Space by Gernot Huffman 1948

210   GAMMA   Luminance has a power law response curve

211   LINEAR   Luminance has a linear response curve

212   LOG10   Luminance has a logarithmic response curve

213   SRGB   See A Standard Default Color Space for the Internet – sRGB
214   www.w3.org/graphics/color/sRGB

215   USER_DEFINED Points of the luminance curve are defined by the user

216

217 **C.X.3   QA Results Module**

218 This module records the latest results of QA activities, such as calibration, performed on the Display
219 Subsystems.

220   **Table C.X.3-1**
221   **QA RESULTS MODULE ATTRIBUTES**

Attribute Name	Tag	Attribute Description
QA Results Sequence	(0028,700F)	Results of QA activities. Exactly one item shall be included for each Display Subsystem present in the Display System.
>Display Subsystem ID	(0028,7003)	The Display Subsystem ID of the item in the Display Subsystem Sequence (0028,7023) to which these results apply.

>Display Subsystem QA Results Sequence	(0028,7010)	Results of QA activities for the identified Display Subsystem.
		Zero or more items shall be included in this sequence.
>>Configuration ID	(0028,700B)	The Configuration ID of the item in the Display Subsystem Configuration Sequence (0028,700A) under which the QA was performed.
		A given Configuration ID value shall not appear more than once in this sequence.
>>Configuration QA Results Sequence	(0028,7011)	Results of QA activities for the identified Display Subsystem in the identified configuration
>>>Display Calibration Result Sequence	(0028,7016)	The most recent calibration result.
		Zero or one item shall be included in this sequence.
>>>>*Include 'Display QA Result Context Macro' Table C.X.3.1-1*		
>>>>Luminance Characteristics ID	(0028,7009)	The Luminance Characteristics ID of the item in the Target Luminance Characteristics Sequence (0028,7008) that represents the target values used during this calibration.
>>>Visual Evaluation Result Sequence	(0028,7015)	The most recent visual evaluation result.
		Zero or one item shall be included in this sequence.
>>>>*Include 'Display QA Result Context Macro' Table C.X.3.1-1*		
>>>>*Include 'Visual Evaluation Result Macro' Table C.X.3.2-1'*		
>>>Luminance Uniformity Result Sequence	(0028,7027)	The most recent luminance uniformity result.
		Zero or one item shall be included in this sequence.
>>>>*Include 'Display QA Result Context Macro' Table C.X.3.1-1*		
>>>>*Include 'Luminance Uniformity Result Macro' Table C.X.3.3-1'*		
>>>Luminance Result Sequence	(0028,7024)	The most recent luminance result.
		Zero or one item shall be included in this sequence.
>>>>*Include 'Display QA Result Context Macro' Table C.X.3.1-1*		
>>>>*Include 'Luminance Result Macro' Table C.X.3.4-1'*		

Note: Several Result Sequences in the above table are permitted to contain zero items. This means that no valid "most recent result" exists. This may be because such results have never been generated, or because the system considers that the most recent result is no longer valid (perhaps due to age or intervening equipment changes). Specifying such policy is outside the scope of DICOM.

C.X.3.1   Display QA Result Context MACRO

This macro records the context for a set of collected display QA results: when they were produced, the person/device that produced them.

230
231

Table C.X.3.1-1
DISPLAY QA RESULT CONTEXT MACRO ATTRIBUTES

Attribute Name	Tag	Attribute Description
Performed Procedure Step Start DateTime	(0040,4050)	Date and Time at which the QA job that generated the results started.
Performed Procedure Step End DateTime	(0040,4051)	Date and Time at which the QA job that generated the results ended.
Actual Human Performer Sequence	(0040,4035)	Human performer(s) responsible for the results.
		Zero or more Items shall be included in this sequence.
>Human Performer Code Sequence	(0040,4009)	Coded identification of the human performer.
		Only a single Item shall be included in this sequence.
>>*Include 'Code Sequence Macro' Table 8.8-1*		No Baseline Context ID is defined.
>Human Performer's Name	(0040,4037)	Name of the human performer.
>Human Performer's Organization	(0040,4036)	Organization to which the human performer is accountable for the results.
Measurement Equipment Sequence	(0028,7012)	Describes the measurement equipment (if any) used in deriving the results. This may describe standalone equipment or may re-iterate details of equipment built into the Display System.
		Zero or more items shall be included in this sequence.
>Measurement Functions	(0028,7013)	Measurement functions of the measurement equipment.
		Enumerated Values:
		PHOTOMETER = measurement of light intensity
		COLORIMETER = measurement of energy along the visible spectrum
		ILLUMINOMETER = measurement of illumination (ambient luminance)
		This multivalued attribute shall contain at most one of each enumerated value. When multiple values are present, the equipment is capable of performing multiple functions.
>Measured Characteristics	(0028,7026)	Characteristic(s) which are measured by the measurement equipment.
		Enumerated Values:
		UNIFORMITY = Luminance uniformity
		LUMINANCE = Luminance
		CHROMATICITY = Chromaticity
		ILLUMINANCE = Illuminance
		This multivalued attribute shall contain at most one of each enumerated value. When multiple values are present, the equipment is capable of measuring multiple

		characteristics.

>Measurement Equipment Type	(0028,7014)	Type of measurement equipment.
		
		Enumerated Values:
		
		       BUILT_IN_FRONT
		
		       BUILT_IN_BACK
		
		       NEAR_RANGE
		
		       TELESCOPIC
		
		See C.X.1.2.

>Manufacturer	(0008,0070)	Manufacturer of the measurement equipment.
>Manufacturer's Model Name	(0008,1090)	Manufacturer's model name of the measurement equipment.
>Device Serial Number	(0018,1000)	The measurement equipment serial number.
>DateTime of Last Calibration	(0018,1202)	Date and time of the last calibration of the measurement equipment. Note: This is likely different than the date of the calibration of the Display System itself.

232

C.X.3.2 Visual Evaluation Result Macro

234 This macro records the result of a Visual Evaluation QA task by a human for a Display System.

235
Table C.X.3.2-1
236
VISUAL EVALUATION RESULT MACRO ATTRIBUTES

Attribute Name	Tag	Attribute Description
Visual Evaluation Test Sequence	(0028,7028)	Test Results of a visual evaluation of the display subsystem output. May include evaluation of multiple test pattern images, as long as all items in this sequence are generated in a single QA test session. One or more Items shall be included in this sequence.

>Test Result	(0028,7029)	Result of a test.
		
		Enumerated Values:
		
		       PASS = Evaluated as acceptable
		
		       FAIL = Evaluated as not acceptable
		
		       SKIP = Not evaluated

>Test Result Comment	(0028,702A)	User comment on the result or performance of the test. Might include scoring values that are not intended to be machine readable.
>Test Pattern Code Sequence	(0028,702C)	Coded identification of the test pattern presented for visual evaluation. Only a single Item shall be included in this sequence.
Baseline CID 8301 Test Pattern Codes.		

>Referenced Image Sequence	(0008,1140)	Reference to the image instance containing the test pattern presented for visual evaluation.
		Only a single Item shall be included in this sequence.
		Required if Test Pattern Code Sequence (0028,702C) is absent in this item. May be present otherwise.
>>Test Image Validation	(0028,702B)	Indication of whether the test image was validated as matching the characteristics of the display system (e.g., resolution and bit depth).
		Enumerated Values:
		MATCHED = the test image was determined to match
		UNMATCHED = the test image was not determined to match
Visual Evaluation Method Code Sequence	(0028,702E)	Coded description of the methodology used during this visual evaluation.
		Only a single Item shall be included in this sequence.
>>*Include 'Code Sequence Macro' Table 8.8-1*		*Baseline Context ID is 8300 Visual Evaluation Methods.*

237

C.X.3.3   Luminance Uniformity Result Macro

This macro records the result of a Luminance Uniformity QA task for a Display Subsystem.

Table C.X.3.3-1
LUMINANCE UNIFORMITY RESULT MACRO ATTRIBUTES

Attribute Name	Tag	Attribute Description
Number of Luminance Points	(0028,701B)	The number of luminance measurements recorded.
		The number depends on the test pattern specified in the Measurement Pattern Code Sequence (0028,702D).
		Note: Most commonly the value is 5, which is a total of the locations on the faceplate of the Display Device (center and four corners) as defined by the TG18-UNL80 or TG18-UNL10 test pattern.
Measurement Pattern Code Sequence	(0028,702D)	Definition of the locations on the display device at which luminance measurements were taken. One measurement is recorded for each location.
>*Include 'Code Sequence Macro' Table 8.8-1*		*Baseline Context ID is 8302 Measurement Pattern Codes.*
DDL Value	(0028,7017)	The integer Digital Driving Level (DDL) at which the luminance values were measured.
		Note: Luminance Uniformity measurement uses the same DDL value for all measurements.
White Point Flag	(0028,7021)	Whether white point values were also recorded at each location.
		Enumerated Values:

| | | YES |
		NO
Luminance Response Sequence	(0028,701C)	Recorded Luminance Response Values
		The number of Items shall match the value of Number of Luminance Points (0028, 701B).
		The Items shall be stored in major row order (from left to right then from top to bottom).
>Luminance Value	(0028,701F)	Luminance in candelas per square meter (cd/m2) at the measurement location.
		Note: Each measured luminance includes both ambient light and light from the display device.
>CIExy White Point	(0028,7018)	White Point at the measurement location,
		The white point is recorded as a CIE xy chromaticity with two dimensionless floating point values where the first is the x value and the second is the y value.
Reflected Ambient Light	(2010,0160)	Reflected ambient light in candelas per square meter (cd/m2) when the measurements were taken.
Ambient Light Value Source	(0028,7025)	Source of the ambient light value.
		Enumerated Values:
		DEFAULT = a configured default value was used.
		MEASURED = the value was measured at the time of the other measurements
		PROVIDED = the value was provided by an external source.

242

C.X.3.4 Luminance Result Macro

This macro records the result of a Luminance QA task for a Display Subsystem.

Table C.X.3.4-1
LUMINANCE RESULT MACRO ATTRIBUTES

Attribute Name	Tag	Attribute Description
Number of Luminance Points	(0028,701B)	The number of luminance measurements recorded.
Luminance Response Sequence	(0028,701C)	Measured Luminance Response Values
		The number of Items shall match the value of Number of Luminance Points (0028,701B).
>DDL Value	(0028,7017)	The integer Digital Driving Level (DDL) at which this luminance value was measured.
		The DDL Value for the first item in the sequence shall be 0. The DDL Value of the last item in the sequence shall be

		the maximum DDL value. Two items in the sequence shall not have the same DDL value. The DDL Value of the items in the sequence shall increase monotonically.
>Luminance Value	(0028,701F)	Luminance in candelas per square meter (cd/m2) at the measurement location. Note: Each measured luminance includes both ambient light and light from the display device.
>CIExy White Point	(0028,7018)	A single measured white point recorded for the display subsystem. The white point is recorded as a CIE xy chromaticity with two dimensionless floating point values where the first is the x value and the second is the y value.
Reflected Ambient Light	(2010,0160)	Reflected ambient light in candelas per square meter (cd/m2) when the measurements were taken.

Ambient Light Value Source	(0028,7025)	Source of the ambient light value.
		
		Enumerated Values:
		
		    DEFAULT = a configured default value was used.
		
		    MEASURED = the value was measured at the time of the other measurements
		
		    PROVIDED = the value was provided by an external source.

247

248

249 **PART 4**

250 **Appendix Y   DISPLAY SYSTEM MANAGEMENT SERVICE CLASS (Normative)**

251 **Y.1   SCOPE**

252 The Display System Service Class allows service users retrieve parameters related to the Display
253 Subsystem(s).
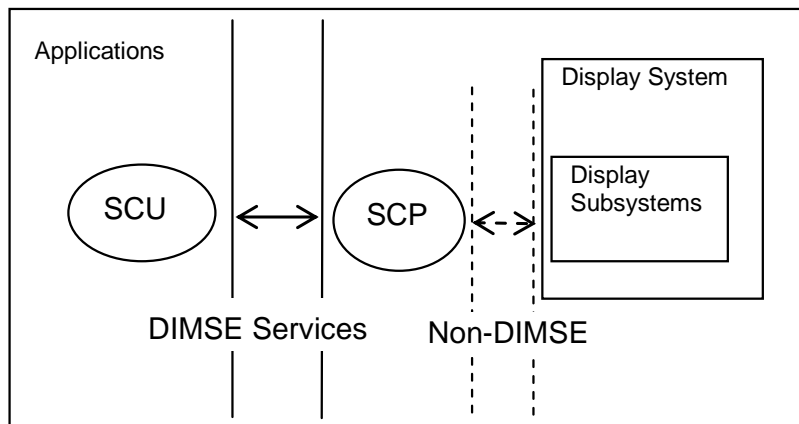
254

Figure X.1-1   Display System Management Data Flow

256

257 **Y.3   DISPLAY SYSTEM SOP CLASS**

258 **Y.3.1   IOD Description**

259 The Display System IOD is an abstraction of the soft-copy display system and is the basic Information Entity
260 to monitor the status of a Display System. The Display System SOP Instance is created by the SCP during
261 start-up of the Display System and has a well-known SOP Instance UID.

262 **Y.3.2   DIMSE Service Group**

263 The DIMSE Services shown in Table X.3.2-1 is applicable to the Display System IOD under the Display
264 System SOP Class.

265 **Table Y.3.2-1   DIMSE SERVICE GROUP – Display System**

DIMSE Service Element	Usage SCU/SCP
N-GET	M/M

266

267 This section describes the behavior of the DIMSE services that are specific for this IOD. The general
268 behavior of the DIMSE services is specified in PS 3.7.

269 **Y.3.2.1   N-GET**

270 N-GET is used to retrieve information from an instance of the Display System SOP class.

271 **Y.3.2.1.1   Attributes**

272 **Y.3.2.1.1.1   Display Subsystem Macros**

273 To reduce the size and complexity of table Y.3.2.1-2, a macro notation is used.

274   **Table Y.3.2.1-1 Result Context Macro**

Attribute Name	Tag	Usage SCU/SCP
Performed Procedure Step Start DateTime	(0040,4050)	-/1
Performed Procedure Step End DateTime	(0040,4051)	-/1
Actual Human Performer Sequence	(0040,4035)	3/2
>Human Performer Code Sequence	(0040,4009)	-/1C (Required if Human Performer's Name (0040,4037) is not present.)
>>Include 'UPS Code Sequence Macro' Table CC.2.5-2a		
>Human Performer's Name	(0040,4037)	-/1C (Required if Human Performer Code Sequence (0040,4009) is not present.)
>Human Performer's Organization	(0040,4036)	-/2
Measurement Equipment Sequence	(0028,7012)	3/2
>Measurement Functions	(0028,7013)	-/1
>Measured Characteristics	(0028,7026)	-/1
>Measurement Equipment Type	(0028,7014)	-/1
>Manufacturer	(0008,0070)	-/1
>Manufacturer's Model Name	(0008,1090)	-/1
>Device Serial Number	(0018,1000)	-/2
>DateTime of Last Calibration	(0018,1202)	-/2

275

276 **Y.3.2.1.1.2   Display System Attribute N-GET Requirements**

277 The attributes which may be retrieved are shown in Table Y.3.2.1-2.

278   **Table Y.3.2.1-2**
279   **DISPLAY SYSTEM N-GET ATTRIBUTES**

Attribute Name	Tag	Usage SCU/SCP
Specific Character Set	(0008,0005)	-/1C (Required if an extended or replacement character set is used)

Display System Module		
Manufacturer	(0008,0070)	3/1
Institution Name	(0008,0080)	3/1
Institution Address	(0008,0081)	3/1
Device Serial Number	(0018,1000)	3/1
Station Name	(0008,1010)	3/2
Institutional Department Name	(0008,1040)	3/2
Manufacturer's Model Name	(0008,1090)	3/1
Equipment Administrator Sequence	(0028,7000)	3/2
>Person Name	(0040,A123)	-/2
>Person Identification Code Sequence	(0040,1101)	-/1
>>Include 'UPS Code Sequence Macro' Table CC.2.5-2a		
>Person's Address	(0040,1102)	-/3
>Person's Telephone Numbers	(0040,1103)	-/3
>Institution Name	(0008,0080)	-/1C (Required if Institution Code Sequence (0008,0082) is not present. May be present otherwise.)
>Institution Address	(0008,0081)	-/3
>Institution Code Sequence	(0008,0082)	-/1C (Required if Institution Name (0008,0080) is not present. May be present otherwise.)
>>Include 'UPS Code Sequence Macro' Table CC.2.5-2a		
Number of Display Subsystems	(0028,7001)	3/1
Display Subsystem Sequence	(0028,7023)	3/1
>Display Subsystem ID	(0028,7003)	-/1
>Display Subsystem Name	(0028,7004)	-/2
>Display Subsystem Description	(0028,7005)	-/2
>Display Device Type Code Sequence	(0028,7022)	-/2
>>Include 'UPS Code Sequence Macro' Table CC.2.5-2a		
>Manufacturer	(0008,0070)	-/2
>Device Serial Number	(0018,1000)	-/2
>Manufacturer's Model Name	(0008,1090)	-/2
>System Status	(0028,7006)	-/1
>System Status Comment	(0028,7007)	-/2
>Display Subsystem Configuration Sequence	(0028,700A)	-/2
>>Configuration ID	(0028,700B)	-/1
>>Configuration Name	(0028,700C)	-/2

>>Configuration Description	(0028,700D)	-/2
>>Referenced Target Luminance Characteristics ID	(0028,700E)	-/2
>Current Configuration ID	(0028,7002)	-/2
>Measurement Equipment Sequence	(0028,7012)	-/2
>>Measurement Functions	(0028,7013)	-/1
>>Measured Characteristics	(0028,7026)	-/1
>>Measurement Equipment Type	(0028,7014)	-/1
>>Manufacturer	(0008,0070)	-/1
>>Manufacturer's Model Name	(0008,1090)	-/1
>>Device Serial Number	(0018,1000)	-/1
>>DateTime of Last Calibration	(0018,1202)	-/2
Target Luminance Characteristics Module		
Target Luminance Characteristics Sequence	(0028,7008)	2/1
>Luminance Characteristics ID	(0028,7009)	-/1
>Display Function Type	(0028,7019)	-/1
>Target Minimum Luminance	(0028,701D)	-/1
>Target Maximum Luminance	(0028,701E)	-/1
>Gamma Value	(0028,701A)	-/1C (Required if the value of Display Function Type (0028,7019) is GAMMA)
>Number of Luminance Points	(0028,701B)	-/1C (Required if the value of Display Function Type (0028,7019) is USER_DEFINED)
>Luminance Response Sequence	(0028,701C)	-/1C (Required if the value of Display Function Type (0028,7019) is USER_DEFINED)
>>DDL Value	(0028,7017)	-/1
>>Luminance Value	(0028,701F)	-/1
>Luminance Response Description	(0028,7020)	-/1C (Required if the value of Display Function Type (0028,7019) is USER_DEFINED. May be present otherwise.)
>CIExy White Point	(0028,7018)	-/3
>Reflected Ambient Light	(2010,0160)	-/3
>Ambient Light Value Source	(0028,7025)	-/1C (Required if Reflected Ambient Light (2010,0160) is present.)
QA Results Module		
QA Results Sequence	(0028,700F)	3/1
>Display Subsystem ID	(0028,7003)	-/1

>Display Subsystem QA Results Sequence	(0028,7010)	-/2
>>Configuration ID	(0028,700B)	-/1
>> Configuration QA Results Sequence	(0028,7011)	-/2
>>>Display Calibration Result Sequence	(0028,7016)	-/2
>>>>*Include 'Result Context Macro' Table Y.3.2.1-1*		
>>>>Luminance Characteristics ID	(0028,7009)	-/1
>>>Visual Evaluation Result Sequence	(0028,7015)	-/2
>>>>*Include 'Result Context Macro' Table Y.3.2.1-1*		
>>>>Visual Evaluation Test Sequence	(0028,7028)	-/1
>>>>>Test Result	(0028,7029)	-/1
>>>>>Test Result Comment	(0028,702A)	-/3
>>>>>Test Pattern Code Sequence	(0028,702C)	-/3
>>>>>>*Include 'UPS Code Sequence Macro' Table CC.2.5-2a*		
>>>>>Referenced Image Sequence	(0008,1140)	-/1C (Required if Test Pattern Code Sequence (0028,702C) is absent in this item. May be present otherwise.)
>>>>>>Referenced SOP Class UID	(0008,1150)	-/1
>>>>>>Referenced SOP Instance UID	(0008,1151)	-/1
>>>>>>Referenced Frame Number	(0008,1160)	-/1C (Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.)
>>>>>>Referenced Segment Number	(0062,000B)	-/1C (Required if the Referenced SOP Instance is a Segmentation or Surface Segmentation and the reference does not apply to all segments and Referenced Frame Number (0008,1160) is not present.)
>>>>>>Test Image Validation	(0028,702B)	-/3
>>>>Visual Evaluation Method Code Sequence	(0028,702E)	-/1
>>>>>*Include 'UPS Code Sequence Macro' Table CC.2.5-2a*		
>>>Luminance Uniformity Result Sequence	(0028,7027)	-/2
>>>>*Include 'Result Context Macro' Table Y.3.2.1-1*		
>>>>Number of Luminance Points	(0028,701B)	-/1
>>>>Measurement Pattern Code Sequence	(0028,702D)	-/1
>>>>>*Include 'UPS Code Sequence Macro' Table CC.2.5-2a*		
>>>>DDL Value	(0028,7017)	-/1

>>>>White Point Flag	(0028,7021)	-/1
>>>>Luminance Response Sequence	(0028,701C)	-/1
>>>>>Luminance Value	(0028,701F)	-/1
>>>>>CIExy White Point	(0028,7018)	-/1C (Required if the value of White Point Flag (0028,7021) is YES.)
>>>>>Reflected Ambient Light	(2010,0160)	-/3
>>>>>Ambient Light Value Source	(0028,7025)	-/1C (Required if Reflected Ambient Light (2010,0160) is present.)
>>>Luminance Result Sequence	(0028,7024)	-/2
>>>>*Include 'Result Context Macro' Table Y.3.2.1-1*		
>>>>Number of Luminance Points	(0028,701B)	-/1
>>>>Luminance Response Sequence	(0028,701C)	-/1
>>>>>DDL Value	(0028,7017)	-/1
>>>>>Luminance Value	(0028,701F)	-/1
>>>>>CIExy White Point	(0028,7018)	-/3
>>>>Reflected Ambient Light	(2010,0160)	-/3
>>>>Ambient Light Value Source	(0028,7025)	-/1C (Required if Reflected Ambient Light (2010,0160) is present.)

280

Y.3.2.1.2   SCU Behavior

281

282 The SCU uses the N-GET to request the SCP to provide the contents of a Display System SOP Instance.
283 The SCU shall specify in the N-GET request primitive the UID of the SOP Instance from which attributes are
284 to be returned.

285 The SCU shall specify the list of Display System Attributes for which values are to be returned. The SCU
286 shall not specify Attributes which are defined within a Sequence, but rather specify the sequence itself to be
287 returned in its entirety.

288 The SCU shall specify in the N-GET request primitive the well-known UID of the SOP Instance.

Y.3.2.1.3   SCP Behavior

289

290 The SCP shall return the values for the specified Attributes of the Display System SOP Instance.

291 The SCP shall return the status code for the requested SOP Instance retrieval. The meaning of success,
292 warning, and failure status codes are defined in PS 3.7.

Y.3.3   SOP Class Definitions and UIDs

293

294 The SOP Class UID of the Display System SOP class shall have the value of "1.2.840.10008.5.1.1.40".

Y.3.4   Reserved Identifications

295

296 The well-known UID of the Display System SOP Instance shall have the value of "1.2.840.10008.5.1.1.40.1".

297

Y.4 CONFORMANCE

Y.4.1 Conformance Statement

300 The implementation conformance statement of this SOP class shall follow PS 3.2.

301 The SCU Conformance Statement shall specify the following items:

302 — Maximum number of associations to be supported at the same time
303 — List of SOP Classes supported
304 — For each of the supported SOP classes:
305   — List of supported SOP class attributes and DIMSE service elements
306   — For each supported attribute (mandatory and optional), a valid value range
307

308 The SCP Conformance Statement shall specify the following items:

309 — Maximum number of associations to be supported at the same time
310 — List of SOP Classes supported
311 — For each of the supported SOP classes:
312   — List of supported SOP class attributes and DIMSE service elements
313   — For each supported attribute (mandatory and optional)
314   — Valid value range
315   — Default value if no value is supplied by the SCU
316   — Status code (Failure or Warning) if the SCU supplies a value that is out of range
317 — For each supported DIMSE service
318   — SCP behavior for all specific status codes
319

320

321 **PART 6**

322 | **Section 6: The following items are added to the table.** |
|---|

323

Tag	Name	Keyword	VR	VM
(0018,1202)	DateTime of Last Calibration	DateTimeOfLastCalibration	DT	1
(0028,7000)	Equipment Administrator Sequence	EquipmentAdministratorSequence	SQ	1
(0028,7001)	Number of Display Subsystems	NumberOfDisplaySubsystems	US	1
(0028,7002)	Current Configuration ID	CurrentConfigurationID	US	1
(0028,7003)	Display Subsystem ID	DisplaySubsystemID	US	1
(0028,7004)	Display Subsystem Name	DisplaySubsystemName	SH	1
(0028,7005)	Display Subsystem Description	DisplaySubsystemDescription	LO	1
(0028,7006)	System Status	SystemStatus	CS	1
(0028,7007)	System Status Comment	SystemStatusComment	LO	1
(0028,7008)	Target Luminance Characteristics Sequence	TargetLuminanceCharacteristicsSequence	SQ	1
(0028,7009)	Luminance Characteristics ID	LuminanceCharacteristicsID	US	1
(0028,700A)	Display Subsystem Configuration Sequence	DisplaySubsystemConfigurationSequence	SQ	1
(0028,700B)	Configuration ID	ConfigurationID	US	1
(0028,700C)	Configuration Name	ConfigurationName	SH	1
(0028,700D)	Configuration Description	ConfigurationDescription	LO	1
(0028,700E)	Referenced Target Luminance Characteristics ID	ReferencedTargetLuminanceCharacteristicsID	US	1
(0028,700F)	QA Results Sequence	QAResultsSequence	SQ	1
(0028,7010)	Display Subsystem QA Results Sequence	DisplaySubsystemQAResultsSequence	SQ	1
(0028,7011)	Configuration QA Results Sequence	ConfigurationQAResultsSequence	SQ	1
(0028,7012)	Measurement Equipment Sequence	MeasurementEquipmentSequence	SQ	1
(0028,7013)	Measurement Functions	MeasurementFunctions	CS	1-n
(0028,7014)	Measurement Equipment Type	MeasurementEquipmentType	CS	1
(0028,7015)	Visual Evaluation Result	VisualEvaluationResultSequence	SQ	1

	Sequence			
(0028,7016)	Display Calibration Result Sequence	DisplayCalibrationResultSequence	SQ	1
(0028,7017)	DDL Value	DDLValue	US	1
(0028,7018)	CIExy White Point	CIExyWhitePoint	FL	2
(0028,7019)	Display Function Type	DisplayFunctionType	CS	1
(0028,701A)	Gamma Value	GammaValue	FL	1
(0028,701B)	Number of Luminance Points	NumberOfLuminancePoints	US	1
(0028,701C)	Luminance Response Sequence	LuminanceResponseSequence	SQ	1
(0028,701D)	Target Minimum Luminance	TargetMinimumLuminance	FL	1
(0028,701E)	Target Maximum Luminance	TargetMaximumLuminance	FL	1
(0028,701F)	Luminance Value	LuminanceValue	FL	1
(0028,7020)	Luminance Response Description	LuminanceResponseDescription	LO	1
(0028,7021)	White Point Flag	WhitePointFlag	CS	1
(0028,7022)	Display Device Type Code Sequence	DisplayDeviceTypeCodeSequence	SQ	1
(0028,7023)	Display Subsystem Sequence	DisplaySubsystemSequence	SQ	1
(0028,7024)	Luminance Result Sequence	LuminanceResultSequence	SQ	1
(0028,7025)	Ambient Light Value Source	AmbientLightValueSource	CS	1
(0028,7026)	Measured Characteristics	MeasuredCharacteristics	CS	1-n
(0028,7027)	Luminance Uniformity Result Sequence	LuminanceUniformityResultSequence	SQ	1
(0028,7028)	Visual Evaluation Test Sequence	VisualEvaluationTestSequence	SQ	1
(00287029)	Test Result	TestResult	CS	1
(0028,702A)	Test Result Comment	TestResultComment	LO	1
(0028,702B)	Test Image Validation	TestImageValidation	CS	1
(0028,702C)	Test Pattern Code Sequence	TestPatternCodeSequence	SQ	1
(0028,702D)	Measurement Pattern Code Sequence	MeasurementPatternCodeSequence	SQ	1
(0028,702E)	Visual Evaluation Method Code Sequence	VisualEvaluationMethodCodeSequence	SQ	1

324

Annex A: Add the following values to table A-1.

325

326 **Table A-1**
327 **UID Values**

UID Value	UID Name	UID Type	Part
1.2.840.10008.5.1.1.40	Display System SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.1.40.1	Display System SOP Instance	Well-known SOP Instance	PS 3.4

328

Annex A: Add the following values to table A-3.

329

330 **Table A-3**
331 **CONTEXT GROUP UID VALUES**

Context UID	Context Identifier	Context Group Name
…	…	…
1.2.840.10008.6.1.980	8300	Visual Evaluation Methods
1.2.840.10008.6.1.981	8301	Test Pattern Codes
1.2.840.10008.6.1.982	8302	Measurement Pattern Codes
1.2.840.10008.6.1.983	8303	Display Device Type
…	…	

332

333 **PART 16**

334 | **Add the following references to Section 2.** |

335 **…**

336 **AAPM ON-LINE REPORT NO. 03: 2005   Assessment of Display Performance for Medical**
337 **Imaging Systems, by American Association of Physicists in Medicine (AAPM) Task**
338 **Group 18**

339 **…**

340 **DIN 6868-57-2001 Image quality assurance in x-ray diagnostics, Acceptance testing for image**
341 **display devices. The German Standards Institution, Deutsches Institut für**
342 **Normung e.V., February 2001.**

343 **…**

344 **IEC 62563-1 Ed. 1.0 2009 Medical Electrical Equipment – Medical image display systems –**
345 **Part 1: Evaluation methods**

346 **…**

347 **SMPTE RP133   Specifications for Medical Diagnostic Imaging Test Pattern for Television**
348 **Monitors and Hard-copy Recording Cameras. White Plains, NY: Society of Motion**
349 **Picture & Television Engineers (SMPTE), 1991.**

350

351 | **Add the following new CIDs to Annex C** |

352 **CID 8300   Visual Evaluation Methods**

353 **Context ID 8300**
354 **Visual Evaluation Methods**
355 **Type: Extensible   Version: 20140331**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	109701	Overall image quality evaluation
DCM	109702	Grayscale resolution evaluation
DCM	109703	Luminance response evaluation
DCM	109704	Luminance uniformity evaluation
DCM	109705	Chromaticity evaluation
DCM	109706	Pixel faults evaluation
DCM	109707	Veiling glare evaluation
DCM	109708	Geometrical image evaluation
DCM	109709	Angular viewing evaluation

DCM	109710	Clinical evaluation

356

CID 8301   Test Pattern Codes

Test patterns for display calibration jobs.

Context ID 8301

Test Pattern Codes

Type: Extensible   Version: 20140331

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	109801	TG18-QC Pattern
DCM	109802	TG18-BR Pattern
DCM	109803	TG18-PQC Pattern
DCM	109804	TG18-CT Pattern
DCM	109805	TG18-LN8-01 Pattern
DCM	109806	TG18-LN8-02 Pattern
DCM	109807	TG18-LN8-03 Pattern
DCM	109808	TG18-LN8-04 Pattern
DCM	109809	TG18-LN8-05 Pattern
DCM	109810	TG18-LN8-06 Pattern
DCM	109811	TG18-LN8-07 Pattern
DCM	109812	TG18-LN8-08 Pattern
DCM	109813	TG18-LN8-09 Pattern
DCM	109814	TG18-LN8-10 Pattern
DCM	109815	TG18-LN8-11 Pattern
DCM	109816	TG18-LN8-12 Pattern
DCM	109817	TG18-LN8-13 Pattern
DCM	109818	TG18-LN8-14 Pattern
DCM	109819	TG18-LN8-15 Pattern
DCM	109820	TG18-LN8-16 Pattern
DCM	109821	TG18-LN8-17 Pattern
DCM	109822	TG18-LN8-18 Pattern
DCM	109823	TG18-LN12-01 Pattern
DCM	109824	TG18-LN12-02 Pattern
DCM	109825	TG18-LN12-03 Pattern
DCM	109826	TG18-LN12-04 Pattern
DCM	109827	TG18-LN12-05 Pattern
DCM	109828	TG18-LN12-06 Pattern

DCM	109829	TG18-LN12-07 Pattern
DCM	109830	TG18-LN12-08 Pattern
DCM	109831	TG18-LN12-09 Pattern
DCM	109832	TG18-LN12-10 Pattern
DCM	109833	TG18-LN12-11 Pattern
DCM	109834	TG18-LN12-12 Pattern
DCM	109835	TG18-LN12-13 Pattern
DCM	109836	TG18-LN12-14 Pattern
DCM	109837	TG18-LN12-15 Pattern
DCM	109838	TG18-LN12-16 Pattern
DCM	109839	TG18-LN12-17 Pattern
DCM	109840	TG18-LN12-18 Pattern
DCM	109841	TG18-UN10 Pattern
DCM	109842	TG18-UN80 Pattern
DCM	109843	TG18-UNL10 Pattern
DCM	109844	TG18-UNL80 Pattern
DCM	109845	TG18-AD Pattern
DCM	109846	TG18-MP Pattern
DCM	109847	TG18-RH10 Pattern
DCM	109848	TG18-RH50 Pattern
DCM	109849	TG18-RH89 Pattern
DCM	109850	TG18-RV10 Pattern
DCM	109851	TG18-RV50 Pattern
DCM	109852	TG18-RV89 Pattern
DCM	109853	TG18-PX Pattern
DCM	109854	TG18-CX Pattern
DCM	109855	TG18-LPH10 Pattern
DCM	109856	TG18-LPH50 Pattern
DCM	109857	TG18-LPH89 Pattern
DCM	109858	TG18-LPV10 Pattern
DCM	109859	TG18-LPV50 Pattern
DCM	109860	TG18-LPV89 Pattern
DCM	109861	TG18-AFC Pattern
DCM	109862	TG18-NS10 Pattern
DCM	109863	TG18-NS50 Pattern
DCM	109864	TG18-NS89 Pattern
DCM	109865	TG18-GV Pattern
DCM	109866	TG18-GVN Pattern

DCM	109867	TG18-GQ Pattern
DCM	109868	TG18-GQN Pattern
DCM	109869	TG18-GQB Pattern
DCM	109870	TG18-GA03 Pattern
DCM	109871	TG18-GA05 Pattern
DCM	109872	TG18-GA08 Pattern
DCM	109873	TG18-GA10 Pattern
DCM	109874	TG18-GA15 Pattern
DCM	109875	TG18-GA20 Pattern
DCM	109876	TG18-GA25 Pattern
DCM	109877	TG18-GA30 Pattern
DCM	109878	TG18-CH Image
DCM	109879	TG18-KN Image
DCM	109880	TG18-MM1 Image
DCM	109881	TG18-MM2 Image
DCM	109901	OIQ Pattern
DCM	109902	ANG Pattern
DCM	109903	GD Pattern
DCM	109904	BN01 Pattern
DCM	109905	BN02 Pattern
DCM	109906	BN03 Pattern
DCM	109907	BN04 Pattern
DCM	109908	BN05 Pattern
DCM	109909	BN06 Pattern
DCM	109910	BN07 Pattern
DCM	109911	BN08 Pattern
DCM	109912	BN09 Pattern
DCM	109913	BN10 Pattern
DCM	109914	BN11 Pattern
DCM	109915	BN12 Pattern
DCM	109916	BN13 Pattern
DCM	109917	BN14 Pattern
DCM	109918	BN15 Pattern
DCM	109919	BN16 Pattern
DCM	109920	BN17 Pattern
DCM	109921	BN18 Pattern
DCM	109931	DIN Geometry Pattern
DCM	109932	DIN Grayscale Pattern

DCM	109933	DIN Resolution Pattern
DCM	109941	White Pattern
DCM	109943	SMPTE Pattern

362

363 **CID 8302   Measurement Pattern Codes**

364 Test pattern images that define measurement points for display calibration jobs.

365   **Context ID 8302**

366   **Measurement Pattern Codes**

367   **Type: Extensible   Version: 20140331**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	109843	TG18-UNL10 Pattern
DCM	109844	TG18-UNL80 Pattern

368

369 **CID 8303   Display Device Type**

370 The type of image display device.

371   **Context ID 8303**

372   **Display Device Type**
373   **Type: Non-Extensible   Version: 20140331**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	109991	CRT Display
DCM	109992	Liquid Crystal Display
DCM	109993	Plasma Display
DCM	109994	OLED
DCM	109995	DLP Rear Projection System
DCM	109996	DLP Front Projection System
DCM	109997	CRT Rear Projection System
DCM	109998	CRT Front Projection System
DCM	109999	Other Projection System

374

375 **Add the following definitions to Annex D.**

376

377 **DICOM Code Definitions (Coding Scheme Designator "DCM" Coding Scheme Version "01")**

Code Value	Code Meaning	Definition
…		
109701	Overall image quality evaluation	Evaluation of overall image quality as described in section 7.3.2 of IEC 62563-1.
109702	Grayscale resolution evaluation	Visual verification of sufficient grayscale resolution based on 8 and 10-bit markers as described in section 7.3.3 of IEC 62563-1.
109703	Luminance response evaluation	Visual evaluation of luminance response using the TG18-CT test pattern as described in section 7.3.4 of IEC 62563-1.
109704	Luminance uniformity evaluation	Visual detection of luminance non-uniformities as described in section 7.3.5 of IEC 62563-1.
109705	Chromaticity evaluation	Visual verification of color uniformity as described in section 7.3.6 of IEC 62563-1.
109706	Pixel faults evaluation	Visual detection of defective pixels on dark (TG18-UN80) and bright (TG18-UN10) images as described in section 7.3.7 of IEC 62563-1.
109707	Veiling glare evaluation	Visual evaluation of veiling glare by looking at low contrast objects on 2 test patterns as described in section 7.3.8 of IEC 62563-1.
109708	Geometrical image evaluation	Visual evaluation of geometry, phase/clock correction and clipping as described in section 7.3.9 of IEC 62563-1.
109709	Angular viewing evaluation	Visual evaluation of viewing angle as described in section 7.3.10 of IEC 62563-1.
109710	Clinical evaluation	Visual evaluation of the appearance of clinical images as described in section 7.3.11 of IEC 62563-1.
109801	TG18-QC Pattern	AAPM TG18-QC Pattern used for evaluation of resolution, luminance, distortion, artifacts. See AAPM ON-LINE REPORT No.03:2005.
109802	TG18-BR Pattern	AAPM TG18-BR Pattern used for the evaluation of the display of low-contrast, fine-detail image structures See AAPM ON-LINE REPORT No.03:2005.
109803	TG18-PQC Pattern	AAPM TG18-PQC Pattern used for evaluation of resolution, luminance, contrast transfer for prints. See AAPM ON-LINE REPORT No.03:2005.
109804	TG18-CT Pattern	AAPM TG18-CT Pattern used for evaluation of luminance response. See AAPM ON-LINE REPORT No.03:2005.

Code Value	Code Meaning	Definition
109805	TG18-LN8-01 Pattern	The 1st image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109806	TG18-LN8-02 Pattern	The 2nd image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109807	TG18-LN8-03 Pattern	The 3rd image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109808	TG18-LN8-04 Pattern	The 4th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109809	TG18-LN8-05 Pattern	The 5th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109810	TG18-LN8-06 Pattern	The 6th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109811	TG18-LN8-07 Pattern	The 7th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109812	TG18-LN8-08 Pattern	The 8th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109813	TG18-LN8-09 Pattern	The 9th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109814	TG18-LN8-10 Pattern	The 10th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration series. See AAPM ON-LINE REPORT No.03:2005.
109815	TG18-LN8-11 Pattern	The 11th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109816	TG18-LN8-12 Pattern	The 12th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109817	TG18-LN8-13 Pattern	The 13th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.

Code Value	Code Meaning	Definition
109818	TG18-LN8-14 Pattern	The 14th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109819	TG18-LN8-15 Pattern	The 15th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109820	TG18-LN8-16 Pattern	The 16th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109821	TG18-LN8-17 Pattern	The 17th image in the AAPM TG18-LN8 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109822	TG18-LN8-18 Pattern	The 18th image in the AAPM TG18-LN8- set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109823	TG18-LN12-01 Pattern	The 1st image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109824	TG18-LN12-02 Pattern	The 2nd image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109825	TG18-LN12-03 Pattern	The 3rd image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109826	TG18-LN12-04 Pattern	The 4th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109827	TG18-LN12-05 Pattern	The 5th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109828	TG18-LN12-06 Pattern	The 6th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109829	TG18-LN12-07 Pattern	The 7th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109830	TG18-LN12-08 Pattern	The 8th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.

Code Value	Code Meaning	Definition
109831	TG18-LN12-09 Pattern	The 9th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109832	TG18-LN12-10 Pattern	The 10th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109833	TG18-LN12-11 Pattern	The 11th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109834	TG18-LN12-12 Pattern	The 12th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109835	TG18-LN12-13 Pattern	The 13th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109836	TG18-LN12-14 Pattern	The 14th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109837	TG18-LN12-15 Pattern	The 15th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109838	TG18-LN12-16 Pattern	The 16th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109839	TG18-LN12-17 Pattern	The 17th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109840	TG18-LN12-18 Pattern	The 18th image in the AAPM TG18-LN12 set used for DICOM grayscale calibration. See AAPM ON-LINE REPORT No.03:2005.
109841	TG18-UN10 Pattern	The AAPM TG18-UN10 Pattern used for evaluation of luminance and color uniformity, and angular response. See AAPM ON-LINE REPORT No.03:2005.
109842	TG18-UN80 Pattern	The AAPM TG18-UN80 Pattern used for evaluation of luminance and color uniformity, and angular response. See AAPM ON-LINE REPORT No.03:2005.

Code Value	Code Meaning	Definition
109843	TG18-UNL10 Pattern	The AAPM TG18-UNL10 Pattern is the AAPM TG-18 UN10 Pattern with added defining lines. See AAPM ON-LINE REPORT No.03:2005.
109844	TG18-UNL80 Pattern	The AAPM TG18-UNL80 Pattern is the AAPM TG-18 UN80 Pattern with added defining lines. See AAPM ON-LINE REPORT No.03:2005.
109845	TG18-AD Pattern	The AAPM TG18-AD Pattern used for visual evaluation of the reflection of ambient light from the display. See AAPM ON-LINE REPORT No.03:2005.
109846	TG18-MP Pattern	The AAPM TG18-MP Pattern used for evaluation of Luminance response (bit-depth resolution). See AAPM ON-LINE REPORT No.03:2005.
109847	TG18-RH10 Pattern	The AAPM TG18-RH10 Pattern used for LSF-line spectra function-(1k and 2k) evaluation by 5 horizontal lines at 10% luminance level. See AAPM ON-LINE REPORT No.03:2005.
109848	TG18-RH50 Pattern	The AAPM TG18-RH50 Pattern used for LSF-line spectra function-(1k and 2k) evaluation by 5 horizontal lines at 50% luminance level. See AAPM ON-LINE REPORT No.03:2005.
109849	TG18-RH89 Pattern	The AAPM TG18-RH89 Pattern used for LSF-line spectra function-(1k and 2k) evaluation by 5 horizontal lines at 89% luminance level. See AAPM ON-LINE REPORT No.03:2005.
109850	TG18-RV10 Pattern	The AAPM TG18-RV10 Pattern used for LSF-line spectra function-(1k and 2k) evaluation by 5 vertical lines at 10% luminance level. See AAPM ON-LINE REPORT No.03:2005.
109851	TG18-RV50 Pattern	The AAPM TG18-RV50 Pattern used for LSF-line spectra function-(1k and 2k) evaluation by 5 vertical lines at 50% luminance level. See AAPM ON-LINE REPORT No.03:2005.
109852	TG18-RV89 Pattern	The AAPM TG18-RV89 Pattern used for LSF-line spectra function-(1k and 2k) evaluation by 5 vertical lines at 89% luminance level. See AAPM ON-LINE REPORT No.03:2005.
109853	TG18-PX Pattern	The AAPM TG18-PX Pattern used for the assessment of display resolution. See AAPM ON-LINE REPORT No.03:2005.

Code Value	Code Meaning	Definition
109854	TG18-CX Pattern	The AAPM TG18-CX Pattern used to assess display resolution and resolution uniformity. See AAPM ON-LINE REPORT No.03:2005.
109855	TG18-LPH10 Pattern	The AAPM TG18-LPH10 Pattern used to assess display resolution. This pattern has horizontal bars consisting of alternating single-pixel-wide lines across the faceplate of display. The lines have a 12% positive contrast against 10% background level of the maximum pixel value. See AAPM ON-LINE REPORT No.03:2005.
109856	TG18-LPH50 Pattern	The AAPM TG18-LPH50 Pattern used to assess display resolution. This pattern has horizontal bars consisting of alternating single-pixel-wide lines across the faceplate of display. The lines have a 50% positive contrast against 10% background level of the maximum pixel value. See AAPM ON-LINE REPORT No.03:2005.
109857	TG18-LPH89 Pattern	The AAPM TG18-LPH89 Pattern used to assess display resolution. This pattern has horizontal bars consisting of alternating single-pixel-wide lines across the faceplate of display. The lines have a 12% positive contrast against 89% background level of the maximum pixel value. See AAPM ON-LINE REPORT No.03:2005.
109858	TG18-LPV10 Pattern	The AAPM TG18-LPV10 Pattern used to assess display resolution. This pattern has vertical bars consisting of alternating single-pixel-wide lines across the faceplate of display. The lines have a 12% positive contrast against 10% background level of the maximum pixel value. See AAPM ON-LINE REPORT No.03:2005.
109859	TG18-LPV50 Pattern	The AAPM TG18-LPV50 Pattern used to assess display resolution. This pattern has vertical bars consisting of alternating single-pixel-wide lines across the faceplate of display. The lines have a 12% positive contrast against 50% background level of the maximum pixel value. See AAPM ON-LINE REPORT No.03:2005.

Code Value	Code Meaning	Definition
109860	TG18-LPV89 Pattern	The AAPM TG18-LPV89 Pattern used to assess display resolution. This pattern has vertical bars consisting of alternating single-pixel-wide lines across the faceplate of display. The lines have a 12% positive contrast against 89% background level of the maximum pixel value. See AAPM ON-LINE REPORT No.03:2005.
109861	TG18-AFC Pattern	The AAPM TG18-AFC Pattern used to assess display noise. See AAPM ON-LINE REPORT No.03:2005
109862	TG18-NS10 Pattern	The AAPM TG18-NS10 Pattern is AAPM TG18-RV10/RH10 with only difference being the absence of the single line at the center of the measurement area. See AAPM ON-LINE REPORT No.03:2005.
109863	TG18-NS50 Pattern	The AAPM TG18-NS50 Pattern is AAPM TG18-RV50/RH50 with only difference being the absence of the single line at the center of the measurement area. See AAPM ON-LINE REPORT No.03:2005.
109864	TG18-NS89 Pattern	The AAPM TG18-NS89 Pattern is AAPM TG18-RV89/RH89 with only difference being the absence of the single line at the center of the measurement area. See AAPM ON-LINE REPORT No.03:2005.
109865	TG18-GV Pattern	The TG18-GV Pattern used to assess display veiling. See AAPM ON-LINE REPORT No.03:2005.
109866	TG18-GVN Pattern	The TG18-GVN Pattern used to assess display veiling. This pattern is identical to AAPM TG18-GV Pattern except that the large-diameter white circle is replaced with a black circle, creating a completely black pattern except for the presence of low-contrast targets. See AAPM ON-LINE REPORT No.03:2005.
109867	TG18-GQ Pattern	The TG18-GQ Pattern used for quantitative assessment of veiling glare. This pattern is identical to TG18-GV except that is lacks the central low-contrast objects. See AAPM ON-LINE REPORT No.03:2005.

Code Value	Code Meaning	Definition
109868	TG18-GQN Pattern	TG18-GQN Pattern used for the quantitative assessment of veiling glare. This pattern is identical to AAPM TG18-GQ Pattern except that the large-diameter white circle is replaced with a black circle, creating a completely black pattern except for the presence of low-contrast targets. See AAPM ON-LINE REPORT No.03:2005.
109869	TG18-GQB Pattern	The TG18-GQB Pattern used for the quantitative assessment of veiling glare. This pattern is identical to AAPM TG18-GQ Pattern except eliminating the central black circle. See AAPM ON-LINE REPORT No.03:2005.
109870	TG18-GA03 Pattern	The TG18-GA03 Pattern used for quantitative assessment of veiling glare. This pattern is identical to TG18-GQ except that the radius of the central black circle is varied as r = 3. See AAPM ON-LINE REPORT No.03:2005.
109871	TG18-GA05 Pattern	The TG18-GA05 Pattern This pattern is identical to TG18-GQ except that the radius of the central black circle is varied as r = 5. See AAPM ON-LINE REPORT No.03:2005.
109872	TG18-GA08 Pattern	The TG18-GA08 Pattern used for quantitative assessment of veiling glare. This pattern is identical to TG18-GQ except that the radius of the central black circle is varied as r = 8. See AAPM ON-LINE REPORT No.03:2005.
109873	TG18-GA10 Pattern	The TG18-GA10 Pattern used for quantitative assessment of veiling glare. This pattern is identical to TG18-GQ except that the radius of the central black circle is varied as r = 10. See AAPM ON-LINE REPORT No.03:2005.
109874	TG18-GA15 Pattern	The TG18-GA15 Pattern used for quantitative assessment of veiling glare. This pattern is identical to TG18-GQ except that the radius of the central black circle is varied as r = 15.
109875	TG18-GA20 Pattern	The TG18-GA20 Pattern used for quantitative assessment of veiling glare. This pattern is identical to TG18-GQ except that the radius of the central black circle is varied as r = 20. See AAPM ON-LINE REPORT No.03:2005.

Code Value	Code Meaning	Definition
109876	TG18-GA25 Pattern	The TG18-GA25 Pattern used for quantitative assessment of veiling glare. This pattern is identical to TG18-GQ except that the radius of the central black circle is varied as r = 25. See AAPM ON-LINE REPORT No.03:2005.
109877	TG18-GA30 Pattern	The TG18-GA30 Pattern used for quantitative assessment of veiling glare. This pattern is identical to TG18-GQ except that the radius of the central black circle is varied as r = 30. See AAPM ON-LINE REPORT No.03:2005.
109878	TG18-CH Image	The AAPM TG18-CH Image is a reference anatomical PA chest image. See AAPM ON-LINE REPORT No.03:2005.
109879	TG18-KN Image	The AAPM TG18-KN Image is a reference anatomical knee image. See AAPM ON-LINE REPORT No.03:2005.
109880	TG18-MM1 Image	The AAPM TG18-MM1 Image is a reference anatomical mammogram image. See AAPM ON-LINE REPORT No.03:2005.
109881	TG18-MM2 Image	The AAPM TG18-MM2 Image is a reference anatomical mammogram image. See AAPM ON-LINE REPORT No.03:2005.
109901	OIQ Pattern	The IEC OIQ Pattern is used as an alternative to the TG18-QC Pattern. See IEC 62563-1 Ed. 1.0 2009.
109902	ANG Pattern	The IEC ANG Pattern used for angular viewing evaluation. See IEC 62563-1 Ed. 1.0 2009.
109903	GD Pattern	The IEC GD Pattern used for geometrical image evaluation. See IEC 62563-1 Ed. 1.0 2009.
109904	BN01 Pattern	The IEC BN01 Pattern is used as an alternative to the TG18-LN-01 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109905	BN02 Pattern	The IEC BN02 Pattern is used as an alternative to the TG18-LN-02 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.

Code Value	Code Meaning	Definition
109906	BN03 Pattern	The IEC BN03 Pattern is used as an alternative to the TG18-LN-03 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109907	BN04 Pattern	The IEC BN04 Pattern is used as an alternative to the TG18-LN-04 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109908	BN05 Pattern	The IEC BN05 Pattern is used as an alternative to the TG18-LN-05 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109909	BN06 Pattern	The IEC BN06 Pattern is used as an alternative to the TG18-LN-06 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109910	BN07 Pattern	The IEC BN07 Pattern is used as an alternative to the TG18-LN-07 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109911	BN08 Pattern	The IEC BN08 Pattern is used as an alternative to the TG18-LN-08 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109912	BN09 Pattern	The IEC BN09 Pattern is used as an alternative to the TG18-LN-09 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109913	BN10 Pattern	The IEC BN10 Pattern is used as an alternative to the TG18-LN-10 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109914	BN11 Pattern	The IEC BN11 Pattern is used as an alternative to the TG18-LN-11 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109915	BN12 Pattern	The IEC BN12 Pattern is used as an alternative to the TG18-LN-12 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.

Code Value	Code Meaning	Definition
109916	BN13 Pattern	The IEC BN13 Pattern is used as an alternative to the TG18-LN-13 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109917	BN14 Pattern	The IEC BN14 Pattern is used as an alternative to the TG18-LN-14 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109918	BN15 Pattern	The IEC BN15 Pattern is used as an alternative to the TG18-LN-15 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109919	BN16 Pattern	The IEC BN16 Pattern is used as an alternative to the TG18-LN-16 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109920	BN17 Pattern	The IEC BN17 Pattern is used as an alternative to the TG18-LN-17 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109921	BN18 Pattern	The IEC BN18 Pattern is used as an alternative to the TG18-LN-18 Pattern, to avoid the use of a cone or baffle with LCDs. See IEC 62563-1 Ed. 1.0 2009.
109931	DIN Grayscale Pattern	Test image "Bild 2" for the gray-scale reproduction of imaging devices. See DIN 6868-57-2001.
109932	DIN Geometry Pattern	Test image "Bild 3" for the geometrical imaging properties of imaging devices. See DIN 6868-57-2001.
109933	DIN Resolution Pattern	Test image "Bild 5" for displaying the spatial and contrast resolution as well as the line structure of imaging devices. See DIN 6868-57-2001.
109941	White Pattern	An alternative to AAPM TG18-UN80, specified at 100% of maximum pixel value.
109943	SMPTE Pattern	A standard display test pattern. See SMPTE RP 133. A pattern is available at: "http://www.dclunie.com/images/smpte.512.512.8.gif".

Code Value	Code Meaning	Definition
109991	CRT Display	A Display Device that displays images on a Cathode Ray Tube.
109992	Liquid Crystal Display	A Display Device that displays images on a Liquid Crystal Display.
109993	Plasma Display	A Display Device that displays images on a Plasma Display.
109994	OLED	A Display Device that displays images on an Organic Light Emitting Diode based display.
109995	DLP Rear Projection System	A Display Device that projects images on a surface from behind using a Digital Light Processing Projector.
109996	DLP Front Projection System	A Display Device that projects images on a surface from in front using a Digital Light Processing Projector.
109997	CRT Rear Projection System	A Display Device that projects images on a surface from behind using a Cathode Ray Tube.
109998	CRT Front Projection System	A Display Device that projects images on a surface from in front using a Cathode Ray Tube.
109999	Other Projection System	A Display Device that projects images on a surface from an unspecified direction using an unspecified means.

378

379

PART 17 Addendum

380

Z   EXAMPLES OF COMMUNICATION OF DISPLAY PARAMETERS (INFORMATIVE)

381
382

Z.1   THE RELATIONSHIP BETWEEN AE AND DISPLAY SYSTEM

383

The Display System SCU and the Display System SCP are peer DICOM Communication of Display Parameters management application entities. The application entity of the Display System SCP supports one or more display subsystems.

Display System SCU and the SCP establish an association by using the association services of the OSI upper layer service.

389 While the association is being established, each of application entity negotiates the supported SOP classes.

390 **Z.2   EXAMPLES OF MESSAGE SEQUENCING**

391 This section provides an examples of message sequencing when using the Display System SOP Class. This
392 section is not intended to provide an exhaustive set of use cases but rather an informative example. There
393 are other valid message sequences that could be used to obtain an equivalent outcome.

394 **Z.2.1   Example of retrieval of status and configuration from display systems**
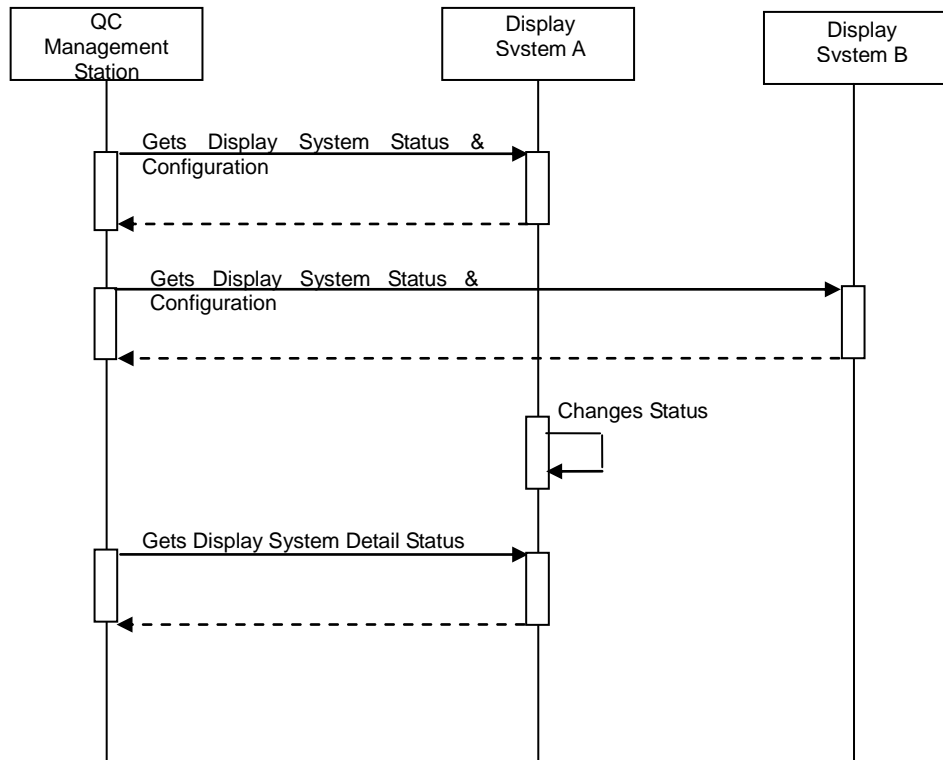
395

396   **Figure Z.2.1-1 Example of System Status and Configuration Message Sequencing**

397 **QC Management Station**: Manages display systems status and Configurations. This works as an SCU.

398 **Display System A and B** : Have display devices. Each display device may be other display vendors'. These
399 work as SCPs.

400 Generation and notification of change events are out of a scope of DICOM.

401

402 **Z.3   EXAMPLES OF DISPLAY SYSTEM SOP CLASS**

403 **Z.3.1   An Example of a typical Display System**

404 A typical Display System is shown in figure Z.3.1-1.
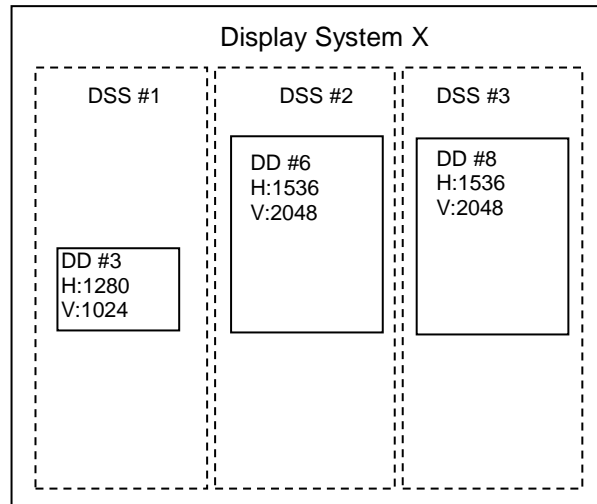
DSS = Display Subsystem
DD = Display Device

405

406 **Figure Z.3.1-1 A typical Display System**

407 The following is an example of an N-GET Request/Response pair for the Display System SOP Class.

408 This example is encoded with Undefined Sequence Length and Undefined Item Length, so it contains
409 Sequence Delimitation Items and Item Delimitation Items.

410 N-GET:

411 ANP   = Attribute Not Present.

412 VNP   = Attribute Present but Value Not Present.

413 -   = Not specified.

414 **Table Z.3.1-1**
415 **N-GET Request/Response Example**

Attribute Name	Tag	N-GET Request (SCU)	N-GET Response (SCP)
SOP Common and Workstation Modules			
Specific Character Set	(0008,0005)	ANP	\ISO 2022 IR 87
Manufacturer	(0008,0070)	VNP	NIPPON Corporation
Institution Name	(0008,0080)	VNP	JIRA Hospital
Institution Address	(0008,0081)	VNP	Bunkyo-ku, Tokyo, Japan

Device Serial Number	(0018,1000)	VNP	SN1234567890
Station Name	(0008,1010)	VNP	WorkstationX
Institutional Department Name	(0008,1040)	VNP	Radiology Dept.
Manufacturer's Model Name	(0008,1090)	VNP	QAStation-Model2013
Equipment Administrator Sequence	(0028,7000)	VNP	
>Item#1 of Equipment Administrator Sequence	(FFFE,E000)	-	
>Person Name	(0040,A123)	-	Yamada^Tarou=山田^太郎=やまだ^たろう
>Person Identification Code Sequence	(0040,1101)	-	
>>Item#1 of Person Identification Code Sequence	(FFFE,E000)	-	
>>Code Value	(0008,0110)	-	111111
>>Coding Scheme Designator	(0008,0102)	-	LOCAL
>>Code Meaning	(0008,0104)	-	Yamada^Tarou
>>Item Delimiter of Item#1 of Person Identification Code Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Person Identification Code Sequence	(FFFE,E0DD)	-	
>Person's Address	(0040,1102)	-	
>Person's Telephone Number	(0040,1103)	-	EXT. 1234
>Institution Name	(0008,0080)	-	IT Support Div.
>Item Delimiter of Item#1 of Equipment Administrator Sequence	(FFFE,E00D)	-	
>Sequence Delimiter of Equipment Administrator Sequence	(FFFE,E0DD)	-	
Display System Module			
Number of Display Subsystems	(0028,7001)		3
Display Subsystem Sequence	(0028,7023)	VNP	
Item#1 of Display Subsystem Sequence	(FFFE,E000)	-	
>Display Subsystem ID	(0028,7003)	-	1
>Display Subsystem Name	(0028,7004)	-	DSS1ofWSX
>Display Subsystem Description	(0028,7005)	-	For viewing a list and reports
>Display Device Type Code Sequence	(0028,7022)	-	
>>Item #1 of Display Device Type Code Sequence	(FFFE,E000)	-	
>>Code Value	(0008,0100)	-	109992
>>Coding Scheme Designator	(0008,0102)	-	DCM
>>Code Meaning	(0008,0104)	-	Liquid Crystal Display
>>Item Delimiter of Item #1 of Display Device Type Code Sequence	(FFFE,E00D)	-	

>>Sequence Delimiter of Display Device Type Code Sequence	(FFFE,E0DD)	-	
>Manufacturer	(0008,0070)	-	Color Monitor Corp.
>Device Serial Number	(0018,1000)	-	C201300011
>Manufacturer's Model Name	(0008,1090)	-	1MC
> System Status	(0028,7006)	-	NORMAL
> System Status Comment	(0028,7007)	-	
>Display Subsystem Configuration Sequence	(0028,700A)	-	
>>Item#1 of Display Subsystem Configuration Sequence	(FFFE,E000)	-	
>> Configuration ID	(0028,700B)	-	1
>> Configuration Name	(0028,700C)	-	DSS1Config1
>> Configuration Description	(0028,700D)	-	Configuration1 of Display Subsystem ID1
>>Referenced Target Luminance Characteristics ID	(0028,700E)	-	1
>>Item Delimiter of Item#1 of Display Subsystem Configuration Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Display Subsystem Configuration Sequence	(FFFE,E0DD)	-	
>Current Configuration ID	(0028,7002)	-	1
>Measurement Equipment Sequence	(0028,7012)	-	
>Sequence Delimiter of Measurement Equipment Sequence	(FFFE,E0DD)	-	
>Item Delimiter of Item#1 of Display System Sequence	(FFFE,E00D)	-	
>Item#2 of Display Subsystem Sequence	(FFFE,E000)	-	
>Display Subsystem ID	(0028,7003)	-	2
>Display Subsystem Name	(0028,7004)	-	DSS2ofWSX
>Display Subsystem Description	(0028,7005)	-	Diagnostic, Monochrome
>Display Device Type Code Sequence	(0028,7022)	-	
>>Item#1 of Display Device Type Code Sequence	(FFFE,E00D)	-	
>>Code Value	(0008,0100)	-	109992
>>Coding Scheme Designator	(0008,0102)	-	DCM
>>Code Meaning	(0008,0104)	-	Liquid Crystal Display
>>Item Delimiter of Display Device Type Code Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Display Device Type Code Sequence	(FFFE,E0DD)	-	

>Manufacturer	(0008,0070)	-	Medical Display Corp.
>Device Serial Number	(0018,1000)	-	3M123456789
>Manufacturer's Model Name	(0008,1090)	-	3MG
> System Status	(0028,7006)	-	NORMAL
> System Status Comment	(0028,7007)	-	
>Display Subsystem Configuration Sequence	(0028,700A)	-	
>>Item#1 of Display Subsystem Configuration Sequence	(FFFE,E000)	-	
>>Configuration ID	(0028,700B)	-	1
>> Configuration Name	(0028,700C)	-	DSS2Config1
>> Configuration Description	(0028,700D)	-	Configuration2 of Display Subsystem ID2
>>Referenced Target Luminance Characteristics ID	(0028,700E)	-	2
>>Item#1 of Display Subsystem Configuration Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Display Subsystem Configuration Sequence	(FFFE,E0DD)	-	
>Current Configuration ID	(0028,7002)	-	1
>Measurement Equipment Sequence	(0028,7012)	-	
>>Item#1 of Measurement Equipment Sequence	(FFFE,E000)	-	
>>Measurement Functions	(0028,7013)	-	PHOTOMETER\COLORIMETER
>>Measured Characteristics	(0028,7026)	-	UNIFORMITY\LUMINANCE\CHROMATICITY
>>Measurement Equipment Type	(0028,7014)	-	BUILT_IN_FRONT
>> Manufacturer	(0008,0070)	-	LuminanceMeasurement Device Inc.
>> Manufacturer's Model Name	(0008,1090)	-	LC1000
>> Device Serial Number	(0018,1000)	-	SN99990001
>> DateTime of Last Calibration	(0018,1202)	-	
>>Item Delimiter of Item#1 of Measurement Equipment Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Measurement Equipment Sequence	(FFFE,E0DD)	-	
>Item Delimiter of Item#2 of Display Subsystem Sequence	(FFFE,E00D)	-	
>Item#3 of Display Subsystem Sequence	(FFFE,E000)	-	
>Display Subsystem ID	(0028,7003)	-	3

>Display Subsystem Name	(0028,7004)	-	DSS3ofWSX
>Display Subsystem Description	(0028,7005)	-	Diagnostic, Monochrome
>Display Device Type Code Sequence	(0028,7022)	-	
>>Item#1 of Display Device Type Code Sequence	(FFFE,E000)	-	
>>Code Value	(0008,0100)	-	109992
>>Coding Scheme Designator	(0008,0102)	-	DCM
>>Code Meaning	(0008,0104)	-	Liquid Crystal Display
>>Item Delimiter of Item#1 of Display Device Type Code Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Display Device Type Code Sequence	(FFFE,E0DD)	-	
>Manufacturer	(0008,0070)	-	Medical Display Corp.
>Device Serial Number	(0018,1000)	-	3M123456790
>Manufacturer's Model Name	(0008,1090)	-	3MG
>System Status	(0028,7006)	-	NORMAL
>System Status Comment	(0028,7007)	-	
> Display Subsystem Configuration Sequence	(0028,700A)	-	
>>Item#1 of Display Subsystem Configuration Sequence	(FFFE,E000)	-	
>> Configuration ID	(0028,700B)	-	1
>> Configuration Name	(0028,700C)	-	DSS3Config1
>> Configuration Description	(0028,700D)	-	Configuration3 of Display Subsystem ID3
>>Referenced Target Luminance Characteristics ID	(0028,700E)	-	3
>>Item Delimiter of Item#1 of Display Subsystem Configuration Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Display Subsystem Configuration Sequence	(FFFE,E0DD)	-	
>Current Configuration ID	(0028,7002)	-	1
>Measurement Equipment Sequence	(0028,7012)	-	
>>Item#1 of Measurement Equipment Sequence	(FFFE,E000)	-	
>>Measurement Functions	(0028,7013)	-	PHOTOMETER\COLORIMETER
>>Measured Characteristics	(0028,7026)	-	UNIFORMITY\LUMINANCE\CHROMATICITY
>>Measurement Equipment Type	(0028,7014)	-	BUILT_IN_FRONT

>> Manufacturer	(0008,0070)	-	LuminanceMeasurement Device Inc.
>>Manufacturer's Model Name	(0008,1090)	-	LC1000
>> Device Serial Number	(0018,1000)	-	SN99990011
>> DateTime of Last Calibration	(0018,1202)	-	
>>Item Delimiter of Item#1 of Measurement Equipment Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Measurement Equipment Sequence	(FFFE,E0DD)	-	
>Item Delimiter of Item#3 of Display Subsystem Sequence	(FFFE,E00D)	-	
>Sequence Delimiter of Display Subsystem Sequence	(FFFE,E0DD)	-	
Target Luminance Characteristics Module			
Target Luminance Characteristics Sequence	(0028,7008)	VNP	
>Item#1 of Target Luminance Characteristics Sequence	(FFFE,E000)	-	
>Luminance Characteristics ID	(0028,7009)	-	1
>Display Function Type	(0028,7019)	-	GAMMA
>Target Minimum Luminance	(0028,701D)	-	0.75
>Target Maximum Luminance	(0028,701E)	-	250
>Gamma Value	(0028,701A)	-	2.2
>Item Delimiter of Item#1 of Target Luminance Characteristics Sequence	(FFFE,E00D)	-	
>Item#2 of Target Luminance Characteristics Sequence	(FFFE,E000)	-	
>Luminance Characteristics ID	(0028,7009)	-	2
>Display Function Type	(0028,7019)	-	GSDF
>Target Minimum Luminance	(0028,701D)	-	0.75
>Target Maximum Luminance	(0028,701E)	-	521.0
>Reflected Ambient Light	(2010,0160)	-	0.410
>Ambient Light Value Source	(0028,7025)	-	DEFAULT
>Item Delimiter of Item#2 of Target Luminance Characteristics Sequence	(FFFE,E00D)	-	
>Item#3 of Target Luminance Characteristics Sequence	(FFFE,E000)	-	
>Luminance Characteristics ID	(0028,7009)	-	3
>Display Function Type	(0028,7019)	-	GSDF
>Target Minimum Luminance	(0028,701D)	-	0.75
>Target Maximum Luminance	(0028,701E)	-	520.0

>Reflected Ambient Light	(2010,0160)	-	0.410
>Ambient Light Value Source	(0028,7025)	-	DEFAULT
>Item Delimiter of Item#3 of Target Luminance Characteristics Sequence	(FFFE,E00D)	-	
>Sequence Delimiter of Target Luminance Characteristics Sequence	(FFFE,E0DD)	-	
QA Result Module			
See Table Z.3.1-2			

416

417 This example is encoded with Undefined Sequence Length and Undefined Item Length , so it contains
418 Sequence Delimitation Items and Item Delimitation Items.

419 **Table Z.3.1-2**
420 **Example of N-GET Request/Response for QA Result Module**

Attribute Name	Tag	N-GET Request (SCU)	N-GET Response (SCP)
QA Result Module			
QA Results Sequence	(0028,700F)	VNP	
>Item#1 of QA Results Sequence	(FFFE,E000)	-	
>Display Subsystem ID	(0028,7003)	-	2
>Display Subsystem QA Results Sequence	(0028,7010)	-	
>>Item#1 of Display System QA Results Sequence	(FFFE,E000)	-	
>>Configuration ID	(0028,700B)	-	1
>>Configuration QA Results Sequence	(0028,7011)	-	
>>>Item#1 of Configuration QA Results Sequence	(FFFE,E000)	-	
>>>Display Calibration Result Sequence	(0028,7016)	-	
>>>>Item#1 of Display Calibration Result Sequence		-	
>>>>Performed Procedure Step Start DateTime	(0040,4050)	-	20130610191010
>>>>Performed Procedure Step End DateTime	(0040,4051)	-	20130610192030
>>>>Actual Human Performer Sequence	(0040,4035)	-	
>>>>Item#1 of Actual Human Performer Sequence	(FFFE,E000)	-	
>>>>>Human Performer's Name	(0040,4037)	-	Kido^Kousei
>>>>>Human Performer's Organization	(0040,4036)	-	QA Dept.

>>>>> Item Delimiter of Item#1 of Actual Human Performer Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Actual Human Performer Sequence	(FFFE,E0DD)	-	
>>>>Measurement Equipment Sequence	(0028,7012)	-	
>>>>>Item#1 of Measurement Equipment Sequence	(FFFE,E000)	-	
>>>>>Measurement Functions	(0028,7013)	-	PHOTOMETER
>>>>>Measured Characteristics	(0028,7026)	-	LUMINANCE
>>>>>Measurement Equipment Type	(0028,7014)	-	NEAR_RANGE
>>>>>Manufacturer	(0008,0070)	-	LUXDEVICE COMPANY
>>>>>Manufacturer's Model Name	(0008,1090)	-	PHOTOMETER MODEL1
>>>>>Device Serial Number	(0018,1000)	-	PM1-141421356
>>>>>DateTime of Last Calibration	(0018,1202)	-	201303310900
>>>>> Item Delimiter of Item#1 of Measurement Equipment Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Measurement Equipment Sequence	(FFFE,E0DD)	-	
>>>>Luminance Characteristics ID	(0028,7009)	-	2
>>>>Item#1 of Display Calibration Result Sequence	(FFFE,E00D)	-	
>>>>Sequence Delimiter of Display Calibration Result Sequence	(FFFE,E0DD)	-	
>>>Visual Evaluation Result Sequence	(0028,7015)	-	
>>>>Item#1 of Visual Evaluation Result Sequence	(FFFE,E000)	-	
>>>>Performed Procedure Step Start DateTime	(0040,4050)	-	201307150900
>>>>Performed Procedure Step End DateTime	(0040,4051)	-	201307150910
>>>>Actual Human Performer Sequence	(0040,4035)	-	
>>>>Item#1 of Actual Human Performer Sequence	(FFFE,E000)	-	
>>>>>Human Performer's Name	(0040,4037)	-	Mokushi^Shirou
>>>>>Human Performer's Organization	(0040,4036)	-	Radiology Dept.
>>>>> Item Delimiter of Item#1 of Actual Human Performer Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Actual Human Performer Sequence	(FFFE,E0DD)	-	
>>>>Visual Evaluation Test Sequence	(0028,7028)	-	

>>>>>Item#1 of Visual Evaluation Test Sequence	(FFFE,E000)	-	
>>>>>Test Result	(0028,7029)	-	PASS
>>>>>Test Result Comment	(0028,702A)	-	All appearances were OK.
>>>>>Test Pattern Code Sequence	(0028,702C)	-	
>>>>>>Item#1 of Test Pattern Code Sequence	(FFFE,E000)	-	
>>>>>>Code Value	(0008,0100)	-	109801
>>>>>>Coding Scheme Designator	(0008,0102)	-	DCM
>>>>>>Code Meaning	(0008,0104)	-	TG18-QC Pattern
>>>>>> Item Delimiter of Item#1 of Test Pattern Code Sequence	(FFFE,E00D)	-	
>>>>>>Sequence Delimiter of Test Pattern Code Sequence	(FFFE,E0DD)	-	
>>>>>Visual Evaluation Method Code Sequence	(0028,702E)	-	
>>>>>>Item#1 of Visual Evaluation Method Code Sequence	(FFFE,E000)	-	
>>>>>>Code Value	(0008,0100)	-	109701
>>>>>>Coding Scheme Designator	(0008,0102)	-	DCM
>>>>>>Code Meaning	(0008,0104)	-	Overall image quality evaluation
>>>>>> Item Delimiter of Item#1 of Visual Evaluation Method Code Sequence	(FFFE,E00D)	-	
>>>>>>Sequence Delimiter of Visual Evaluation Method Code Sequence	(FFFE,E0DD)	-	
>>>> Item Delimiter of Item#1 of Visual Evaluation Test Sequence	(FFFE,E00D)	-	
>>>Sequence Delimiter of Visual Evaluation Test Sequence	(FFFE,E0DD)	-	
>>>Luminance Uniformity Result Sequence	(0028,7027)	-	
>>>>Item#1 of Luminance Uniformity Result Sequence	(FFFE,E000)	-	
>>>>Performed Procedure Step Start DateTime	(0040,4050)	-	20130610195000
>>>>Performed Procedure Step End DateTime	(0040,4051)	-	20130610195900
>>>>Actual Human Performer Sequence	(0040,4035)	-	
>>>>Item#1 of Actual Human Performer Sequence	(FFFE,E000)	-	
>>>>>Human Performer's Name	(0040,4037)	-	Kido^Kousei

>>>>>Human Performer's Organization	(0040,4036)	-	QA Dept.
>>>>>Item Delimiter of Item#1 of Actual Human Performer Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Actual Human Performer Sequence	(FFFE,E0DD)	-	
>>>>Measurement Equipment Sequence	(0028,7012)	-	
>>>>>Item#1 of Measurement Equipment Sequence	(FFFE,E000)	-	
>>>>>Measurement Functions	(0028,7013)	-	PHOTOMETER\COLORIMETER
>>>>>Measured Characteristics	(0028,7026)	-	LUMINANCE\CHROMATICITY
>>>>>Measurement Equipment Type	(0028,7014)	-	NEAR_RANGE
>>>>>Manufacturer	(0008,0070)	-	LUXDEVICE COMPANY
>>>>>Manufacturer's Model Name	(0008,1090)	-	PHOTOMETER MODEL1
>>>>>Device Serial Number	(0018,1000)	-	PM1-141421356
>>>>>DateTime of Last Calibration	(0018,1202)	-	201303310900
>>>>>Item Delimiter of Item#1 of Measurement Equipment Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Measurement Equipment Sequence	(FFFE,E0DD)	-	
>>>>Number of Luminance Points	(0028,701B)	-	5
>>>>Measurement Pattern Code Sequence	(0028,702D)	-	
>>>>>Item#1 of Measurement Pattern Code Sequence	(FFFE,E000)	-	
>>>>>Code Value	(0008,0100)	-	109844
>>>>>Coding Scheme Designator	(0008,0102)	-	DCM
>>>>>Code Meaning	(0008,0104)	-	TG18-UNL80 Pattern
>>>>>Item Delimiter of Item#1 of Measurement Pattern Code Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Measurement Pattern Code Sequence	(FFFE,E0DD)	-	
>>>>DDL Value	(0028,7017)	-	204
>>>>White Point Flag	(0028,7021)	-	YES
>>>>Luminance Response Sequence	(0028,701C)	-	
>>>>>Item#1 of Luminance Response Sequence	(FFFE,E000)	-	
>>>>>Luminance Value	(0028,701F)	-	191.5
>>>>>CIExy White Point	(0028,7018)	-	0.940694\1.455249
>>>>>Item Delimiter of Item#1Luminance Response Sequence	(FFFE,E00D)	-	

>>>>>Item#2 of Luminance Response Sequence	(FFFE,E000)	-	
>>>>>Luminance Value	(0028,701F)	-	176.1
>>>>>CIExy White Point	(0028,7018)	-	0.932555\1.421037
>>>>>Item Delimiter of Item#2 Luminance Response Sequence	(FFFE,E00D)	-	
>>>>>Item#3 of Luminance Response Sequence	(FFFE,E000)	-	
>>>>>Luminance Value	(0028,701F)	-	197.2
>>>>>CIExy White Point	(0028,7018)	-	0.918886\1.416465
>>>>>Item Delimiter of Item#3 of Luminance Response Sequence	(FFFE,E00D)	-	
>>>>>Item#4 of Luminance Response Sequence	(FFFE,E000)	-	
>>>>>Luminance Value	(0028,701F)	-	202.5
>>>>>CIExy White Point	(0028,7018)	-	0.940709\1.434902
>>>>>Item Delimiter of Item#4 Luminance Response Sequence	(FFFE,E00D)	-	
>>>>>Item#5 of Luminance Response Sequence	(FFFE,E000)	-	
>>>>>Luminance Value	(0028,701F)	-	195.8
>>>>>CIExy White Point	(0028,7018)	-	0.946154\1.477551
>>>>>Item Delimiter of Item#5Luminance Response Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Luminance Response Sequence	(FFFE,E0DD)	-	
>>>Luminance Result Sequence	(0028,7024)	-	
>>>>Item#1 of Luminance Result Sequence	(0028,e000)	-	
>>>>Performed Procedure Step Start DateTime	(0040,4050)	-	20130610194000
>>>>Performed Procedure Step End DateTime	(0040,4051)	-	20130610195500
>>>>Actual Human Performer Sequence	(0040,4035)	-	
>>>>Item#1 of Actual Human Performer Sequence	(FFFE,E000)	-	
>>>>>Human Performer's Name	(0040,4037)	-	Kido^Kousei
>>>>>Human Performer's Organization	(0040,4036)	-	QA Dept.
>>>>>Item Delimiter of Item#1 of Actual Human Performer Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Actual Human Performer Sequence	(FFFE,E0DD)	-	

>>>>Measurement Equipment Sequence	(0028,7012)	-	
>>>>>Item#1 of Measurement Equipment Sequence	(FFFE,E000)	-	
>>>>>Measurement Functions	(0028,7013)	-	PHOTOMETER\COLORIMET ER
>>>>>Measured Characteristics	(0028,7026)	-	LUMINANCE\CHROMATICITY
>>>>>Measurement Equipment Type	(0028,7014)	-	NEAR_RANGE
>>>>>Manufacturer	(0008,0070)	-	LUXDEVICE COMPANY
>>>>>Manufacturer's Model Name	(0008,1090)	-	PHOTOMETER MODEL1
>>>>>Device Serial Number	(0018,1000)	-	PM1-141421356
>>>>>DateTime of Last Calibration	(0018,1202)	-	201303310900
>>>>>Item Delimiter of Item#1 of Measurement Equipment Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Measurement Equipment Sequence	(FFFE,E0DD)	-	
>>>>Number of Luminance Points	(0028,701B)	-	18
>>>>Luminance Response Sequence	(0028,701C)	-	
>>>>>Item#1 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	0
>>>>>Luminance Value	(0028,701F)	-	0.64
>>>>>Item Delimiter of Item#1 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#2 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	15
>>>>>Luminance Value	(0028,701F)	-	2.03
>>>>>Item Delimiter of Item#2 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#3 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	30
>>>>>Luminance Value	(0028,701F)	-	4.17
>>>>>Item Delimiter of Item#3 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#4 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	45
>>>>>Luminance Value	(0028,701F)	-	7.11
>>>>>Item Delimiter of Item#4 of Luminance Result Sequence	(FFFE,E00D)	-	

>>>>>Item#5 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	60
>>>>>Luminance Value	(0028,701F)	-	11.12
>>>>>Item Delimiter of Item#5 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#6 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	75
>>>>>Luminance Value	(0028,701F)	-	16.75
>>>>>Item Delimiter of Item#6 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#7 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	90
>>>>>Luminance Value	(0028,701F)	-	24.07
>>>>>Item Delimiter of Item#7 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#8 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	105
>>>>>Luminance Value	(0028,701F)	-	33.67
>>>>>Item Delimiter of Item#8 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#9 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	120
>>>>>Luminance Value	(0028,701F)	-	46.24
>>>>>Item Delimiter of Item#9 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#10 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	135
>>>>>Luminance Value	(0028,701F)	-	63.12
>>>>>Item Delimiter of Item#10 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#11 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	150
>>>>>Luminance Value	(0028,701F)	-	83.94

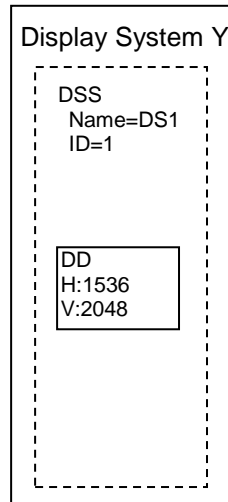|			
>>>>>Item Delimiter of Item#11 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#12 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	160
>>>>>Luminance Value	(0028,701F)	-	110.6
>>>>>Item Delimiter of Item#12 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#13 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	180
>>>>>Luminance Value	(0028,701F)	-	144.9
>>>>>Item Delimiter of Item#13 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#14 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	195
>>>>>Luminance Value	(0028,701F)	-	190.1
>>>>>Item Delimiter of Item#14 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#15 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	210
>>>>>Luminance Value	(0028,701F)	-	246.3
>>>>>Item Delimiter of Item#15 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#16 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	225
>>>>>Luminance Value	(0028,701F)	-	317.8
>>>>>Item Delimiter of Item#16 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#17 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	240
>>>>>Luminance Value	(0028,701F)	-	406.4
>>>>>Item Delimiter of Item#17 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Item#18 of Luminance Result Sequence	(FFFE,E000)	-	
>>>>>DDL Value	(0028,7017)	-	255

>>>>>Luminance Value	(0028,701F)	-	520.9
>>>>>Item Delimiter of Item#18 of Luminance Result Sequence	(FFFE,E00D)	-	
>>>>>Sequence Delimiter of Luminance Response Sequence	(FFFE,E0DD)	-	
>>>>Reflected Ambient Light	(2010,0160)	-	0.408
>>>>Ambient Light Source	(0028,7025)	-	MEASURED
>>>>Item Delimiter of Item#1 of Luminance Result Sequence	(0028,e00D)	-	
>>>>Sequence Delimiter of Luminance Result Sequence	(0028,e0DD)	-	
>>>Item#1 Configuration QA Results Sequence	(0028,e00D)	-	
>>>Sequence Delimiter of Configuration QA Results Sequence	(0028,e0DD)	-	
>>Item Delimiter of Item#1 of Display System QA Results Sequence	(0028,e00D)	-	
>Sequence Delimiter of Display System QA Results Sequence	(0028,e0DD)	-	
>Item Delimiter of Item#1 of QA Results Sequence	(0028,e00D)	-	
>Item#2 of QA Results Sequence	(FFFE,E000)	-	
>Display Subsystem ID	(0028,7003)	-	3
...		-	The SCP will return the values for Display Subsystem ID=3.
>Item Delimiter of Item#2 of QA Results Sequence	(0028,e00D)	-	
>Sequence Delimiter of QA Results Sequence	(0028,e0DD)	-	

421

422 **Z.3.2   An Example of a Tablet Display**

423 A Tablet Display System is shown in figure Z.3.2-1.

```
┌─────────────────────────┐
│ Display System Y        │
│  ┌ ─ ─ ─ ─ ─ ─ ─ ─ ┐    │
│    DSS                  │
│  │  Name=DS1       │    │
│     ID=1                │
│  │                 │    │
│                         │
│  │                 │    │
│     ┌───────────┐       │
│  │  │DD         │  │    │
│     │H:1536     │       │
│  │  │V:2048     │  │    │
│     └───────────┘       │
│  │                 │    │
│                         │
│  │                 │    │
│                         │
│  │                 │    │
│                         │
│  │                 │    │
│  └ ─ ─ ─ ─ ─ ─ ─ ─ ┘    │
└─────────────────────────┘
```

DSS = Display Subsystem
DD = Display Device

424

Figure Z.3.2-1 A Tablet Display System

426 The following is an example of an N-GET Request/Response pair for the Display System SOP Class.

427 This example is encoded with Undefined Sequence Length and Undefined Item Length, so it contains
428 Sequence Delimitation Items and Item Delimitation Items.

429 N-GET:

430 ANP   = Attribute Not Present.

431 VNP   = Attribute Present but Value Not Present.

432 -   = Not specified.

433   **Table Z.3.2-1**
434   **N-GET Request/Response Example**

Attribute Name	Tag	N-GET Request (SCU)	N-GET Response (SCP)
SOP Common and Workstation Modules			
Specific Character Set	(0008,0005)	ANP	\ISO 2022 IR 87
Manufacturer	(0008,0070)	VNP	Tablet Corp.
Institution Name	(0008,0080)	VNP	JIRA Hospital
Institution Address	(0008,0081)	VNP	Bunkyo-ku, Tokyo, Japan
Device Serial Number	(0018,1000)	VNP	AA1B22CCCC3D

Station Name	(0008,1010)	VNP	TABLET1
Institutional Department Name	(0008,1040)	VNP	Radiology Dept.
Manufacturer's Model Name	(0008,1090)	VNP	MC706J/A
Equipment Administrator Sequence	(0028,7000)	VNP	
>Item#1 of Equipment Administrator Sequence	(FFFE,E000)	-	
>Person Name	(0040,A123)	-	Yamada^Tarou=山田^太郎=やまだ^たろう
>Person Identification Code Sequence	(0040,1101)	-	
>>Item#1 of Person Identification Code Sequence	(FFFE,E000)	-	
>>Code Value	(0008,0110)	-	111111
>>Coding Scheme Designator	(0008,0102)	-	LOCAL
>>Code Meaning	(0008,0104)	-	Yamada^Tarou
>>Item Delimiter of Item#1 of Person Identification Code Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Person Identification Code Sequence	(FFFE,E0DD)	-	
>Person's Address	(0040,1102)	-	
>Person's Telephone Number	(0040,1103)	-	EXT. 1234
>Institution Name	(0008,0080)	-	IT Support Div.
>Item Delimiter of Item#1 of Equipment Administrator Sequence	(FFFE,E00D)	-	
>Sequence Delimiter of Equipment Administrator Sequence	(FFFE,E0DD)	-	
Display System Module			
Number of Display Subsystems	(0028,7001)	VNP	1
Display Subsystem Sequence	(0028,7023)	VNP	
Item#1 of Display Subsystem Sequence	(FFFE,E000)	-	
>Display Subsystem ID	(0028,7003)	-	1
>Display Subsystem Name	(0028,7004)	-	DS1
>Display Subsystem Description	(0028,7005)	-	Embedded LCD
>Display Device Type Code Sequence	(0028,7022)	-	
>>Item #1 of Display Device Type Code Sequence	(FFFE,E000)	-	
>>Code Value	(0008,0100)	-	109992
>>Coding Scheme Designator	(0008,0102)	-	DCM
>>Code Meaning	(0008,0104)	-	Liquid Crystal Display
>>Item Delimiter of Item #1 of Display Device Type Code Sequence	(FFFE,E00D)	-	

>>Sequence Delimiter of Display Device Type Code Sequence	(FFFE,E0DD)	-	
>Manufacturer	(0008,0070)	-	Tablet Corp.
>Device Serial Number	(0018,1000)	-	AA1B22CCCC3D
>Manufacturer's Model Name	(0008,1090)	-	MC706J/A
>System Status	(0028,7006)	-	NORMAL
>System Status Comment	(0028,7007)	-	
>Display Subsystem Configuration Sequence	(0028,700A)	-	
>>Item#1 of Display Subsystem Configuration Sequence	(FFFE,E000)	-	
>>Configuration ID	(0028,700B)	-	1
>>Configuration Name	(0028,700C)	-	DS1Config1
>> Configuration Description	(0028,700D)	-	Configuration1 of Display Subsystem ID1
>>Referenced Target Luminance Characteristics ID	(0028,700E)	-	1
>>Item Delimiter of Item#1 of Display Subsystem Configuration Sequence	(FFFE,E00D)	-	
>>Sequence Delimiter of Display Subsystem Configuration Sequence	(FFFE,E0DD)	-	
>Current Configuration ID	(0028,7002)	-	1
>Measurement Equipment Sequence	(0028,7012)	-	
>Sequence Delimiter of Measurement Equipment Sequence	(FFFE,E0DD)	-	
>Item Delimiter of Item#1 of Display System Sequence	(FFFE,E00D)	-	
>Sequence Delimiter of Display Subsystem Sequence	(FFFE,E0DD)	-	
Target Luminance Characteristics Module			
Target Luminance Characteristics Sequence	(0028,7008)	VNP	
>Item#1 of Target Luminance Characteristics Sequence	(FFFE,E000)	-	
>Luminance Characteristics ID	(0028,7009)	-	1
>Display Function Type	(0028,7019)	-	GAMMA
>Target Minimum Luminance	(0028,701D)	-	0.75
>Target Maximum Luminance	(0028,701E)	-	300
>Gamma Value	(0028,701A)	-	2.2
>Item Delimiter of Item#1 of Target Luminance Characteristics Sequence	(FFFE,E00D)	-	

>Sequence Delimiter of Target Luminance Characteristics Sequence	(FFFE,E0DD)	-	
QA Result Module			
QA Results Sequence	(0028,700F)	VNP	
>Item#1 of QA Results Sequence	(FFFE,E000)	-	
>Display Subsystem ID	(0028,7003)	-	1
>Display Subsystem QA Results Sequence	(0028,7010)	-	There are no items in this sequence in this example.

435