



KONICA MINOLTA

PRINT MANAGEMENT SYSTEM

Printlink5-IN

DICOM 3.0 Conformance Statement

CODE NO. 1116

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NOTE: Descriptions in this document are subject to change without prior notice.

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0 INTRODUCTION

This document describes the compatibility of the DICOM interface for Print Management System Printlink 5-IN with DICOM 3.0.

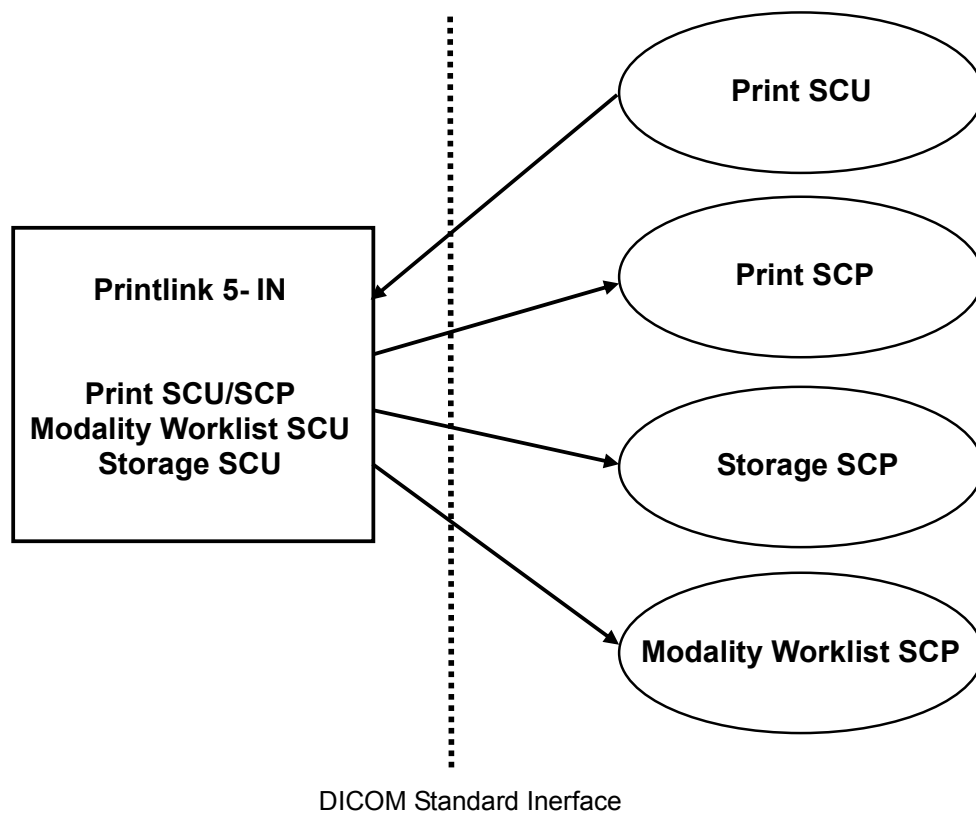
0.1 Abbreviations

AE DICOM Application Entity
IOD DICOM Information Object Definition
PDU Protocol Data Unit
SCU DICOM Service Class User(client using this DICOM service)
SCP DICOM Service Class Provider(server providing this service)
SOP Service/Object Pair
UID Unique Identifier

1 IMPLEMENTATION MODEL

The DICOM interface for Print Management System Printlink 5-IN operates as a DICOM Print Service Class SCU/SCP, DICOM Storage Service Class SCU, and Modality Worklist Management Service Class SCU.

1.1 Application Data Flow Diagram



1.2 Functional Definitions of AEs

1.2.1 Print SCP

When the Host (SCU) sends a request to Printlink 5-IN (SCP) to print an image, it operates the SOP class defined by the Print Management Service Class.

DIMSE service, which is defined in each SOP class, is used for operating the SOP class.

Printlink 5-IN (SCP) processes and makes hard copies of the image data according to the individual attribute values which were specified by the Host (SCU).

1.2.2 Print SCU

When Printlink 5-IN (SCU) sends a request to the imager (SCP) to print an image, it operates the SOP class defined by the Print Management Service Class.

DIMSE service, which is defined in each SOP class, is used for operating the SOP class.

The imager (SCP) processes and makes hard copies of the image data according to the individual attribute values which were specified by the Printlink 5-IN (SCU).

1.2.3 Storage SCU

The Storage SCU for Printlink 5-IN operates as a communication process and starts to send images in response to a C-STORE-RQ after a request to establish an association sent to an external AE is accepted.

1.2.4 Modality Worklist Management SCU

The Modality Worklist Management SCU for Printlink 5-IN operates as a communication process and obtains patient / study data in response to a C-FIND-RQ after a request to establish an association sent to an external AE is accepted.

1.3 Sequencing of Real World Activities

This model is not applicable to the Sequencing of Real-World Activities.

2 AE SPECIFICATION

2.1 Print Service Class SCP Specification

Printlink 5-IN receives print request associations and operates as an application entity.

Printlink 5-IN conforms as an SCP to the following SOP classes.

Supported SOP Class and UID Value:

SOP Class name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23

2.1.1 Association Establishment Policies

This section describes the conditions for establishing association.

2.1.1.1 General

The following value should be applied to the application text name.

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

Print Management SCU and SCP utilize the DICOM upper layer to establish association. In doing so, Printlink 5-IN (SCP) receives an association started by the Host (SCU). The maximum PDU size used is 64KB.

2.1.1.2 Number of Associations

The number of associations that Printlink 5-IN can support at the same time is 8.

2.1.1.3 Asynchronous Nature

Printlink 5-IN manages asynchronous N-EVENT messages. However, a message is sent whenever necessary.

2.1.1.4 Implementation Identification Information

The Implementation Class UID for Printlink 5-IN is "1.2.392.200036.9107.500.521".

The Implementation Version Name for Printlink 5-IN is "KC_PLNK5_X.XXXXX".
"X.XXXXX" indicates the software version.

e.g. KC_PLNK5_1.00R00

2.1.2 Association in Real World Activities

Printlink 5-IN (SCP) starts associations to publish asynchronous N-EVENT messages.

2.1.3 Association Acceptance Policy

Printlink 5-IN (SCP) establishes associations from the association establishment request from the HOST (SCU).

2.1.3.1 Real World Activities

2.1.3.1.1 Associated Real World Activity

Image data and various parameters are sent to the imager with the command from the HOST (SCU) in order to print image data on films.

C-ECHO, Film Session, Film Box, and Image BOX can be requested with a command from the HOST (SCU).

2.1.3.1.2 Presentation Context Table

Printlink 5-IN (SCP) issues the presentation context that is indicated in the following table.

Abstract syntax		Role
Name	UID	
Verification SOP Class	1.2.840.10008.1.1	SCP
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	
Printer Management Class	1.2.840.10008.5.1.1.16	
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	

Extended negotiations can be conformed to as required.

The following transmission syntax is valid against the individual SOP classes mentioned above.

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

2.1.4 SOP Class Adaptability

2.1.4.1 Verification SOP Class

Printlink 5-IN provides adaptability to the Verification SOP Class.
C-ECHO Response is returned when C-ECHO Request is received.

2.1.5 Basic Grayscale Print Management Meta SOP Class

Printlink 5-IN provides adaptability to the Basic Grayscale Print Management Meta SOP Class.
Printlink 5-IN supports the following SOP classes.

Supported SOP Classes and UID values

SOP Class	UID Value
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Printer SOP Class	1.2.840.10008.5.1.1.16

2.1.5.1 Basic Film Session SOP Class

Tag	Name	VR	VM	Permitted Value
(2000, 0010)	Copies	IS	1	Copy Count 1-99
(2000, 0020)	Print Priority	CS	1	Print Priority LOW MED HIGH
(2000, 0030)	Medium Type	CS	1	Medium Type CLEAR FILM = Clear Base BLUE FILM = Blue Base DR CLEAR FILM = DR Clear Base DR BLUE FILM = DR Blue Base
(2000, 0040)	Film Destination	CS	1	Film Destination MAGAZINE PROCESSOR BIN_1-BIN_6 = Sorter
(2000, 0060)	Memory Allocation	LO	1	Memory Allocation Set the required memory contents. Indicate in KB.

Tags other than those listed above will not be checked.
Furthermore, this model will conform to non-conforming header data as required.

2.1.5.2 Basic Film Box SOP Class

Tag	Name	VR	VM	Permitted Value
(0010, 0010)	Patient's Name	PN	1	Patient Name
(0010, 0020)	Patient ID	LO	1	Patient ID
(2010, 0010)	Image Display Format	ST	1	STANDARD, C, R ROW, R1, R2 SLIDE (Dependence on the imager)
(2010, 0030)	Annotation Display Format ID	CS	1	Annotation Display Format ID P1 = PORTRAIT L1 = LANDSCAPE TM = TIME CC = Copy Count ID = Modality ID MS = Message
(2010, 0040)	Film Orientation	CS	1	Film Orientation PORTRAIT LANDSCAPE
(2010, 0050)	Film Size ID	CS	1	Film Size (Dependence on the imager) 8INX10IN 10INX12IN 11INX14IN 14INX14IN 14INX17IN
(2010, 0060)	Magnification Type	CS	1	Magnification Type REPLICATE = Replicate interpolation CUBIC = Cubic B-Spline interpolation
(2010, 0080)	Smoothing Type	CS	1	Smoothing Type 1-7 Mag. Type (2010, 0060) = Only for CUBIC
(2010, 0100)	Borders	CS	1	Border Density BLACK WHITE
(2010, 0120)	Min Density	US	1	20-400 (Dependence on the imager)
(2010, 0130)	Max Density	US	1	20-400 (Dependence on the imager)

Tags other than those listed above will not be checked.
Furthermore, this model will conform to non-conforming header data as required.

2.1.5.3 Basic Grayscale Image Box SOP Class

Tag	Name	VR	VM	Permitted Value
(0028, 0002)	Samples per Pixel	US	1	Samples per Pixel
(0028, 0004)	Photometric Interpretation	CS	1	Photometric Interpretation MONOCHROME1: Min. VOI pixel = White MONOCHROME2: Min. VOI pixel = Black
(0028, 0010)	Rows	US	1	Pixels in image Y orientation
(0028, 0011)	Columns	US	1	Pixels in image X orientation
(0028, 0034)	Pixel Aspect Ratio	IS	2	Pixel Aspect Ratio
(0028, 0100)	Bits Allocated	US	1	Bits allocated in pixel. Non-used bits are included. 0008:8 (8bits) 000A:16 (12bits) Those other than the above result in an error.
(0028, 0101)	Bits Stored	US	1	Bits in 1 pixel. 0008:8 (8bits) 000C:12 (12bits)
(0028, 0102)	High Bit	US	1	High Bit Pixel data MBS (Most significant bit) 0007:(Bits Stored = 8) 000B:(Bits Stored = 12)
(0028, 0103)	Pixel Representation	US	1	Pixel data representation 0000 = Integer with no marks
(2020, 0010)	Image Position	US	1	Image Position Image position that structures a page.
(2020, 0020)	Polarity	CS	1	Polarity NORMAL REVERSE
(2020, 0030)	Requested Image Size	CS	1	Requested Image Size (dependence on the imager)
(2020, 0040)	Requested Decimate/Crop Behavior	CS	1	Requested Decimate/Crop Behavior (dependence on the imager)
(7fe0, 0010)	Pixel Data	OW OB	1	Pixel Data

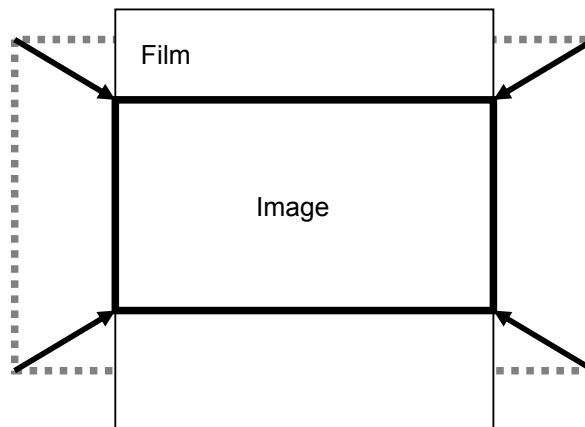
Tags other than those listed above will not be checked.
Furthermore, this model will conform to non-conforming header data as required.

The requested image size conforms only to a one-frame format.
The following is a list of the maximum size that can be set for each film.
However, some sizes cannot be printed depending on the image aspect.

Film Size	Film Orientation	Maximum Size (mm)
14 X 17	Portrait	341 (353)
	Landscape	417 (425)
14 X 14	Portrait	341 (353)
	Landscape	341 (349)
11 X 14	Portrait	266 (274)
	Landscape	341 (353)
10 X 12	Portrait	240 (252)
	Landscape	290 (298)
8 X 10	Portrait	189 (201)
	Landscape	240 (248)

The values in the parentheses are for the CR mode.

When the requested image size exceeds the one indicated above, images are treated as shown below,



The magnification rate in the imager is applied to print an image on a film.
In such a case, the ratio of the size between the printed image size and request image size is printed on the film.

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2.1.5.4 Printer SOP Class

Tag	Name	VR	VM	Permitted Value
(0008, 0070)	Manufacturer	LO	1	Manufacturer KONICA MINOLTA
(0008, 1090)	Manufacturer's Model Name	LO	1	Manufacturer's Model Name PRINTLINK 5-IN
(0018, 1000)	Device Serial Number	LO	1	Serial Number of Printlink 5-IN
(0018, 1020)	Software Version	LO	1	Software Version of Printlink 5-IN
(2110, 0010)	Printer Status	CS	1	Printer Status NORMAL WARNING FAILURE
(2110, 0020)	Printer Status Information	CS	1	Printer Status Information Refer to Appndix.C
(2110, 0030)	Printer Name	LO	1	Printer Name DRYPRO832

2.1.5.5 Annotation Box SOP Class

Tag	Name	VR	VM	Permitted Value
(2030, 0010)	Annotation position	US	1	Annotation position
(2030, 0020)	Text string	LO	1	Text string

2.1.6 Presentation LUT SOP Class

Tag	Name	VR	VM	Permitted Value
(2050, 0010)	Presentation LUT Sequence	SQ	1	Presentation LUT Sequence
(0028, 3002)	LUT Descriptor	US¥ US	1	LUT Descriptor
(0028, 3003)	LUT Explanation	LO	1	LUT Explanation
(0028, 3006)	LUT Data	US or SS	1-n	LUT Data
(2110, 0030)	Presentation LUT Shape	CS	1	Presentation LUT Shape IDENTITY/LIN OD

2.2 Storage Service Class SCU SPECIFICATION

Printlink 5-IN supports the following SOP classes as a Storage Service Class SCU.

SOP Class Name	SOP Class UID
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

2.2.1 Association Establishment Policies

2.2.1.1 General

The Storage SCU for Printlink 5-IN identifies and uses the following application context name.

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

The maximum and initial PDU size is 64KB.

2.2.1.2 Number of Associations

The Storage SCU for Printlink 5-IN issues a request to establish a maximum of 7 associations to an external AE which is a different device.

Parallel processing is performed to each AE in which an association has been established.

2.2.1.3 Asynchronous Nature

Asynchronous processing is not supported.

2.2.1.4 Implementation Identification Information

The value of the identification data is issued by Konica Minolta.

Description	Value
Implementation Class UID	Printlink 5-IN 1.2.392.200036.9107.500.521
Implementation Version Name	KC_PLNK5_X.XXXXX

* "X.XXXXX" indicates the software version.

2.2.1.5 Real World Activities - STORE

2.2.1.5.1 Associated Real World Activities - C-STORE

The Storage SCU for Printlink 5-IN sends a C-STORE request to the Remote Storage SCP and sends image data in a real world where associations are established.

2.2.1.5.2 Presentation Context Table

The Storage SCU for Printlink 5-IN accepts presentation context that are listed in the following table.

Presentation Context Table			
Name	UID	Role	Expansion Negotiation
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	SCU	None

Transfer Syntax	
Name List	UID List
Implicit VR Little Endian	1.2.840.10008.1.2

2.3 Modality Worklist Management Service Class SCU Specifications

Printlink 5-IN supports the following SOP class as a Modality Worklist Management Service Class SCU.

SOP Class Name	SOP Class UID
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31

2.3.1 Association Establishment Policies

2.3.1.1 General

The Modality Worklist Management SCU for Printlink 5-IN identifies and uses the following application context name.

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

The maximum and initial PDU size is 64KB.

2.3.1.2 Number of Associations

The Modality Worklist Management SCU for Printlink 5-IN issues a request to establish a maximum of one association at one time to an external AE which is a different device.

2.3.1.3 Asynchronous Nature

Asynchronous processing is not supported.

2.3.1.4 Implementation Identification Information

The value of the identification data is issued by Konica Minolta.

Description	Value
Implementation Class UID	Printlink 5-IN 1.2.392.200036.9107.500.521
Implementation Version Name	KC_PLNK5_X.XXXXX

* "X.XXXXX" indicates the software version.

2.3.1.5 Real World Activities - FIND

2.3.1.5.1 Associated Real World Activities - FIND Request

The Modality Worklist SCU for Printlink 5-IN sends a C-FIND request to the Remote Modality Worklist SCP and receives patient data.

2.3.1.5.2 Presentation Context Table

The Modality Worklist SCU for Printlink 5-IN makes requests in the presentation context shown in the following table.

Presentation Context Table			
Abstract Syntax		Role	Expansion Negotiation
Name	UID		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	SCU	None

Transfer Syntax	
Name List	UID List
Implicit VR Little Endian	1.2.840.10008.1.2

2.3.2 Verification keys to request

The Modality Worklist SCU for Printlink 5-IN combines the following verification keys arbitrarily and obtains patient data.

Indication / Module	Tag	Verification Key Type	Note / Type of Verification
Reserved procedural step			
Sequence of reserved procedural step	(0040,0100)	R	The attribute of a reserved procedural step is only obtained with a matched sequence. A sequence of a reserved procedural step contains only a single item.
> AE name of reserved station	(0040,0001)	R	The AE name of a reserved station is obtained only with a matched single value.
> Starting date of reserved procedural step	(0040,0002)	R	The starting date of a reserved procedural step is obtained with a matched single value.
> Starting time of reserved procedural step	(0040,0003)	R	The starting time of a reserved procedural step is obtained with a matched single value.
> Modality	(0008,0060)	R	A modality is obtained with a matched single value.
> Name of reserved consulting doctor	(0040,0006)	R	The name of the reserved consulting doctor is obtained with a matched single value or wildcard verification.
Image service request			
Receipt number	(0008,0050)	O	A receipt number is obtained with a matched single value.
Requested procedure			
Requested procedure ID	(0040,1001)	O	A requested procedure ID is obtained with a matched single value.
Patient identity			
Patient name	(0010,0010)	R	A patient name is obtained with a matched single value or wildcard verification.
Patient ID	(0010,0020)	R	A patient ID is obtained with a matched single value.

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2.3.3 Response keys to request

The Modality Worklist SCU for Printlink 5-IN combines the following response keys arbitrarily and obtains or requests for patient data.

Indication / Module	Tag	Verification Key Type	Note
Same for SOP			
Specific character group	(0008,0005)	1C	
Reserved procedural step			
Sequence of reserved procedural step	(0040,0100)	1	
> AE name of reserved station	(0040,0001)	1	
> Starting date of reserved procedural step	(0040,0002)	1	
> Starting time of reserved procedural step	(0040,0003)	1	
> Modality	(0008,0060)	1	
> Name of reserved consulting doctor	(0040,0006)	2	
Requested procedure			
Requested procedure ID	(0040,1001)	1	
Image service request			
Receipt number	(0008,0050)	2	
Patient identity			
Patient name	(0010,0010)	1	
Patient ID	(0010,0020)	1	
Patient description			
Patient date of birth	(0010,0030)	2	
Patient gender	(0010,0040)	2	
Patient weight	(0010,1030)	2	
Patient height	(0010,1040)	2	
Patient consultation			
Patient status	(0038,0500)	2	
Pregnancy status	(0010,21C0)	2	
Medical precautions	(0010,2000)	2	
Contrast medium allergy	(0010,2110)	2	
Special care	(0038,0050)	2	

3 COMMUNICATION PROFILES

3.1 Supported Communication Stack

The upper-layer protocol for DICOM TCP/IP defined in DICOM PS3.8 is provided.

3.2 TCP/IP Stack

Printlink 5-IN succeeds the TCP/IP stack from the Windows XP system.

3.2.1 Support of physical media

10BaseT,100BaseTX and 1000BaseT are supported in the execution of TCP/IP.

4 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

4.1 Standard Expansion / Specialization / Privatization SOP

The following attributes are reserved in the Basic Film Box SOP Class.

- (2011,0010)
- (2011,1011)
- (2011,1021)
- (2011,1030)
- (2011,1031)
- (2011,1040)
- (2011,1050)
- (2011,1060)
- (2011,1070)
- (2011,1080)
- (2011,1090)

The following attributes are reserved in the Printer SOP Class.

- (2011,0010)
- (2011,10A0)
- (2011,10A1)
- (2011,10B0)
- (2011,10B1)
- (2011,10B2)
- (2011,10C0)
- (2011,10C1)
- (2011,10D0)
- (2011,10D1)
- (2011,10E0)
- (2011,10F0)

4.2 Personal Transfer Syntax

Not in use.

5 CONFIGURATION

5.1 AE Title / Presentation Address Mapping

The conformance from a Printlink 5-IN AE title to a presentation address is performed by making indications to a configuration file.

5.2 Configurable Parameters

5.2.1 Number of simultaneous associations

Printlink 5-IN accepts a maximum of 16 associations from an external AE simultaneously.

5.2.2 Maximum PDU size

The following is the maximum PDU size supported by Printlink 5-IN.

Maximum PDU Size (Byte)	Setting Range
65535	4096 - 65535

6 SUPPORT OF EXTENDED CHARACTER SETS

For elements in which the VR is SH (short column), LO (long column), ST (short text), LT (long text), or PN (person's name), extended characters can be used by specifying an extended character repertoire in the attribute specific character group (0008,0005) for SC Image IOD. The extended character repertoire uses ISO 2022 IR87, ISO 2022 IR13, or ISO 2022 IR87.

Appendix.A (Characteristic State Code)

A.1 Basic Film Session SOP Class

A.1.1 N-CREATE

SCU can use N-CREATE to request SCP to create Basic Film Session SOP Instance.

<Basic Film Session SOP Class>

N-CREATE Success	Printlink 5-IN (SCP) produces a Basic Film Box SOP instance and initializes its attribute.
N-CREATE Failure	Printlink 5-IN (SCP) has not yet produced a Basic Film Box SOP instance.
N-CREATE Warning	Printlink 5-IN (SCP) was not able to produce a Basic Film Box SOP instance in the specified method.

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

0000H (Success)	
0106H (Warning)	Specified Value was not supported.
0116H (Failure)	Default Value was used.
0120H (Failure)	No Value was specified.
B605H (Failure)	Density Value that cannot be supported was specified.

<Unique status codes>

No unique status code exists.

* Printlink 5-IN sends A-ABORT in case of that an internal error or unknown error happened.

A.1.2 N-SET

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Basic Film Session SOP Class>

0000H (Success)	
0106H (Warning)	Specified Value was not supported.
0116H (Failure)	Default Value was used.
0120H (Failure)	No Value was specified.
B605H (Failure)	Density Value that cannot be supported was specified.

<Unique status codes>

No unique status code exists.

* Printlink 5-IN sends A-ABORT in case of that an internal error or unknown error happened.

A.1.3 N-ACTION

SCU can use N-ACTION in order to request SCP to print one or more copies of a film session that belongs to a film session.

<Basic Film Session SOP Class>

N-ACTION Success	Printlink 5-IN (SCP) received a film attributed to a Film Session to print.
N-ACTION Failure	Printlink 5-IN (SCP) did not print a Film Session.
N-ACTION Warning	Printlink 5-IN (SCP) did not print a Film Session in the specified method.

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

No common status codes in the Print Management Service Class exists.
--

<Unique status codes>

0000H (Success)	A film attributed in a Film Session was received for printing.
0105H (Failure)	Operation was invalid.
0112H (Failure)	Specified Film Session did not exist.
B605H (Failure)	Print Queue was full.
C605H (Failure)	Instance UID cannot be created since Print Queue is full.
C613H (Failure)	The size of the linked image exceeds that of Image Box.

* Printlink 5-IN sends A-ABORT in case of that an internal error or unknown error happened.

A.1.4 N-DELETE

SCU can use N-DELETE to request SCP to delete the entire Basic Film Session SOP Instance hierarchical structure.

<Basic Film Session SOP Class>

N-DELETE Success	Printlink 5-IN (SCP) deleted the specified hierarchical structure of SOP Instance.
N-DELETE Failure	Printlink 5-IN (SCP) did not delete the specified hierarchical structure of SOP Instance.

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

No common status codes in the Print Management Service Class exists.
--

<Unique status codes>

No unique status code exists.

A.2 Basic Film Box SOP Class

A.2.1 N-CREATE

SCU can use N-CREATE to request SCP to create Basic Film Box SOP Instance.

<Basic Film Box SOP Class>

N-CREATE Success	Printlink 5-IN (SCP) produces a Basic Film Box SOP instance and initializes its attribute.
N-CREATE Failure	Printlink 5-IN (SCP) has not yet produced a Basic Film Box SOP instance.
N-CREATE Warning	Printlink 5-IN (SCP) produced a Basic Film Box SOP instance in the specified method using the initial value.

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

0000H (Success)	
0106H (Warning)	No Value was specified.
B605H (Warning)	Received a density value that exceeds the minimum or maximum density
0116H (Failure)	Default Value was used.
0120H (Failure)	Specified Value was not supported.

<Unique status codes>

No unique status code exists.

* Printlink 5-IN sends A-ABORT in case of that an internal error or unknown error happened.

A.2.2 N-SET

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

0000H (Success)	
0106H (Warning)	No Value was specified.
B605H (Warning)	Received a density value that exceeds the minimum or maximum density
0116H (Failure)	Default Value was used.
0120H (Failure)	Specified Value was not supported.

<Unique status codes>

No unique status code exists.

* Printlink 5-IN sends A-ABORT in case of that an internal error or unknown error happened.

A.2.3 N-ACTION

SCU can use N-ACTION in order to request SCP to print one or more copies of one film box of a film session that belongs to a film session.

<Basic Film Box SOP Class>

N-ACTION Success	Printlink 5-IN (SCP) received a film attributed to a Film Session to print.
N-ACTION Failure	Printlink 5-IN (SCP) did not print a film box.
N-ACTION Warning	Printlink 5-IN (SCP) cannot print a film box in the specified method.

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

No common status codes in the Print Management Service Class exists.
--

<Unique status codes>

0000H (Success)	A film attributed in a Film Session was received for printing.
0106H (Failure)	Specified Value was not supported.
0116H (Failure)	Default Value was used.
0120H (Failure)	No Value was specified.
C602H (Failure)	Print Queue was full.
C613H (Failure)	The size of the linked image exceeds that of Image Box.

* Printlink 5-IN sends A-ABORT in case of that an internal error or unknown error happened.

A.2.4 N-DELETE

SCU can use N-DELETE to request SCP to delete the Basic Film Session SOP Instance hierarchical structure.

<Basic Film Box SOP Class>

N-DELETE Success	Printlink 5-IN (SCP) deleted the specified hierarchical structure of SOP Instance.
N-DELETE Failure	Printlink 5-IN (SCP) did not delete the specified hierarchical structure of SOP Instance.

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

No common status codes in the Print Management Service Class exists.
--

<Unique status codes>

No unique status code exists.

A.3 Basic Grayscale Image Box SOP Class

A.3.1 N-SET

SCU can use N-SET to request SCP to update a Basic Grayscale Image Box SOP Instance. SCU specifies just the Basic Grayscale Image Box SOP Instance UID that is attributed in the Film Box SOP Instance that was last produced and specifies the attribute list which is set with an attribute value.

<Basic Film Box SOP Class>

N-SET Success	Printlink 5-IN (SCP) updated an attribute specified in the SOP Instance.
N-SET Failure	Printlink 5-IN (SCP) did not update an attribute specified in the SOP Instance.
N-SET Warning	Printlink 5-IN (SCP) was not able to operate in the specified method.

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

0000H (Success)	
0106H (Warning)	Specified Value was not supported.
0116H (Failure)	Default Value was used.
0120H (Failure)	No Value was specified.

<Unique status codes>

No unique status code exists.

* Printlink 5-IN sends A-ABORT in case of that an internal error or unknown error happened.

A.4 Printer SOP Class

A.4.1 N-GET

SCU can use N-GET to request SCP to get SOP Instance.

<Printer SOP Class>

N-GET Success	Printlink 5-IN (SCP) searched the SOP Instance.
N-GET Failure	Printlink 5-IN (SCP) did not search the SOP Instance.

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

0000H (Success)	U/M : Imager Status, Imager Status Information U/U : Manufacturer, Model, Installation Serial No., Software Version, Imager Name
-----------------	--

<Unique status codes>

No unique status code exists.

A.5 Annotation Box SOP Class

A.5.1 N-SET

SCU can use N-SET to request SCP to update an Annotation Box SOP Instance. SCU specifies just the Basic Grayscale Image Box SOP Instance UID that is attributed in the Film Box SOP Instance that was last produced and specifies the attribute list which is set with an attribute value.

<Basic Film Box SOP Class>

N-SET Success	Printlink 5-IN (SCP) updated an attribute specified in the SOP Instance.
N-SET Warning	Printlink 5-IN (SCP) was not able to operate in the specified method.

Printlink 5-IN (SCP) returns one of the following status codes to the Host (SCP).

<Common status codes in the Print Management Service Class>

0000H (Success)	
0106H (Warning)	Specified Value was not supported.

<Unique status codes>

No unique status code exists.

* Printlink 5-IN sends A-ABORT in case of that an internal error or unknown error happened.

A maximum of 64 characters can be set in a text string. Furthermore, the value specified in the Host (SCU) is not applied as the position for displaying the annotation text string. Instead, the value specified in Printlink 5-IN (SCP) is applied.

Appendix.B (Imager Format)

B.1.1 DRYPRO722

<Standard Format - Same for Portrait and Landscape>

FOTMAT	11X14	14X14	14X17
STANDARD¥ 1,1	O	O	O
STANDARD¥ 1,2	O	O	O
STANDARD¥ 2,1	O	-	O
STANDARD¥ 1,3	O	-	O
STANDARD¥ 3,1	-	-	O
STANDARD¥ 2,2	O	O	O
STANDARD¥ 2,3	O	O	O
STANDARD¥ 3,2	O	-	O
STANDARD¥ 2,4	O	O	O
STANDARD¥ 4,2	O	-	O
STANDARD¥ 3,3	O	O	O
STANDARD¥ 3,4	O	O	O
STANDARD¥ 4,3	O	-	O
STANDARD¥ 3,5	O	O	O
STANDARD¥ 5,3	O	-	O
STANDARD¥ 4,4	O	O	O
STANDARD¥ 3,6	O	-	O
STANDARD¥ 6,3	-	-	O
STANDARD¥ 4,5	O	O	O
STANDARD¥ 5,4	O	-	O
STANDARD¥ 4,6	O	O	O
STANDARD¥ 6,4	O	-	O
STANDARD¥ 5,5	O	O	O
STANDARD¥ 4,7	O	O	O
STANDARD¥ 7,4	O	-	O
STANDARD¥ 5,6	O	O	O
STANDARD¥ 6,5	O	-	O
STANDARD¥ 4,8	O	-	O
STANDARD¥ 8,4	-	-	O
STANDARD¥ 5,7	O	O	O
STANDARD¥ 7,5	O	-	O
STANDARD¥ 6,6	O	O	O
STANDARD¥ 5,8	O	-	O
STANDARD¥ 8,5	-	-	O
STANDARD¥ 6,7	O	O	O
STANDARD¥ 7,6	O	-	O
STANDARD¥ 6,8	O	O	O
STANDARD¥ 8,6	O	-	O

* The above formats are supported regardless of the film size or film orientation, however, formats such as STANDARD¥1,2 or STANDARD¥2,1 cannot be supported at the same time (setting upon installation).

<Mixed Format - Same for Portrait and Landscape>

FOTMAT	11X14	14X14	14X17
ROW¥ 3,2	O	O	O
ROW¥ 2,3	O	O	O
ROW¥ 3,3,2	O	O	O
ROW¥ 2,3,3	O	O	O
ROW¥ 3,3,3,2	-	O	O
ROW¥ 2,3,3,3	-	O	O

B.1.2 Other restriction on the image data

- A different image size must not exist in one film.

- Number of printable pixels (PP)

Film Size	Film Orientation	Columns	Row
14 x 17	PORTRAIT	8550	10225
	LANDSCAPE	10450	8325
14 x1 4	PORTRAIT	8550	8325
	LANDSCAPE		
11 x1 4	PORTRAIT	6675	8325
	LANDSCAPE	8550	6450

- The number of maximum input pixels in one frame of each format is obtained with the following calculations.

Number of maximum input horizontal pixels = $(PP - 300 - 50 \times (Nh - 1)) / Nh$

Number of maximum input vertical pixels = $(PP - 525 - 50 \times (Nv - 1)) / Nv$

(PP: Number of print valid pixels / Nh: Number of frames in horizontal direction / Nv: Number of frames in vertical direction)

* The number of maximum input pixels in the horizontal direction cannot exceed 5120.

e.g. The number of maximum input pixels in one frame for 14 x 17, 3 x 4 (12 frame format), and Portrait is obtained as shown below.

Number of maximum input horizontal pixels = $(8550 - 300 - 50 \times (3 - 1)) / 3 = 2716$

Number of maximum input vertical pixels = $(10225 - 525 - 50 \times (4 - 1)) / 4 = 2387$

- The number of specified input pixels to realize life size at 80µm in a one frame.

Film Size	Film Orientation	Columns	Row
14 x 17	PORTRAIT	4272	5112
	LANDSCAPE	5224	4162
14 x 14	PORTRAIT	4272	4162
	LANDSCAPE		
11 x 14	PORTRAIT	3336	4162
	LANDSCAPE	4272	3224

B.2.1 DRYPRO832/ DRYPRO873

<Standard Format - Same for Portrait and Landscape (1/2)>

FOTMAT	8X10	10X12	11X14	14X14	14X17
STANDARD¥ 1,1	O	O	O	O	O
STANDARD¥ 1,2	O	O	O	O	O
STANDARD¥ 2,1	O	O	O	O	O
STANDARD¥ 1,3	O	O	O	O	O
STANDARD¥ 3,1	O	O	O	O	O
STANDARD¥ 2,2	O	O	O	O	O
STANDARD¥ 2,3	O	O	O	O	O
STANDARD¥ 3,2	O	O	O	O	O
STANDARD¥ 2,4	O	O	O	O	O
STANDARD¥ 4,2	O	O	O	O	O
STANDARD¥ 3,3	O	O	O	O	O
STANDARD¥ 3,4	O	O	O	O	O
STANDARD¥ 4,3	O	O	O	O	O
STANDARD¥ 3,5	O	O	O	O	O
STANDARD¥ 5,3	O	O	O	O	O
STANDARD¥ 4,4	O	O	O	O	O
STANDARD¥ 3,6	O	O	O	O	O
STANDARD¥ 6,3	O	O	O	O	O
STANDARD¥ 4,5	O	O	O	O	O
STANDARD¥ 5,4	O	O	O	O	O
STANDARD¥ 4,6	O	O	O	O	O
STANDARD¥ 6,4	O	O	O	O	O
STANDARD¥ 5,5	O	O	O	O	O
STANDARD¥ 4,7	O	O	O	O	O
STANDARD¥ 7,4	O	O	O	O	O
STANDARD¥ 5,6	O	O	O	O	O
STANDARD¥ 6,5	O	O	O	O	O
STANDARD¥ 4,8	O	O	O	O	O
STANDARD¥ 8,4	O	O	O	O	O
STANDARD¥ 5,7	O	O	O	O	O
STANDARD¥ 7,5	O	O	O	O	O
STANDARD¥ 6,6	O	O	O	O	O
STANDARD¥ 5,8	O	O	O	O	O
STANDARD¥ 8,5	O	O	O	O	O
STANDARD¥ 6,7	O	O	O	O	O
STANDARD¥ 7,6	O	O	O	O	O
STANDARD¥ 6,8	O	O	O	O	O
STANDARD¥ 8,6	O	O	O	O	O
STANDARD¥ 7,7	O	O	O	O	O
STANDARD¥ 6,9	O	O	O	O	O
STANDARD¥ 9,6	O	O	O	O	O
STANDARD¥ 7,8	O	O	O	O	O
STANDARD¥ 8,7	O	O	O	O	O

<Standard Format - Same for Portrait and Landscape (2/2)>

FOTMAT	8X10	10X12	11X14	14X14	14X17
STANDARD¥ 6,10	O	O	O	O	O
STANDARD¥ 10,6	O	O	O	O	O
STANDARD¥ 7,9	O	O	O	O	O
STANDARD¥ 9,7	O	O	O	O	O
STANDARD¥ 8,8	O	O	O	O	O

* The above formats are supported regardless of the film size or direction.

<Mixed Format - Same for Portrait and Landscape>

FOTMAT	8X10	10X12	11X14	14X14	14X17
ROW¥ 3,2	O	O	O	O	O
ROW¥ 2,3	O	O	O	O	O
ROW¥ 3,3,2	O	O	O	O	O
ROW¥ 2,3,3	O	O	O	O	O
ROW¥ 4,4,2	O	O	O	O	O
ROW¥ 2,4,4	O	O	O	O	O
ROW¥ 3,3,3,2	O	O	O	O	O
ROW¥ 2,3,3,3	O	O	O	O	O
ROW¥ 3,1	O	O	O	O	O
ROW¥ 1,3	O	O	O	O	O
ROW¥ 2,2,1	O	O	O	O	O
ROW¥ 1,2,2	O	O	O	O	O
ROW¥ 3,3,1	O	O	O	O	O
ROW¥ 1,3,3	O	O	O	O	O
ROW¥ 3,3,3,1	O	O	O	O	O
ROW¥ 1,3,3,3	O	O	O	O	O

* The above formats are supported regardless of the film size or direction.

B.2.2 Other restriction on the image data

B.2.2.1 Pitch size 78.6µm

B.2.2.1.1 Normal mode (When the image size is not reduced)

<Number of Valid Print Pixels (PP)>

Stamp Character Orientation: Same as the film orientation

Film Size	Film Orientation	Modality Mode		CR Mode	
		Horizontal	Vertical	Horizontal	Vertical
14 x 17	PORTRAIT	4310	5160	4496	5412
	LANDSCAPE	5312	4230	5412	4496
14 x 14	PORTRAIT	4310	4200	4496	4446
	LANDSCAPE	4320	4210	4446	4496
11 x 14	PORTRAIT	3340	4180	3492	4496
	LANDSCAPE	4344	3276	4496	3492
10 x 12	PORTRAIT	3000	3530	3200	3798
	LANDSCAPE	3696	2934	3798	3200
8 x 10	PORTRAIT	2350	2880	2550	3148
	LANDSCAPE	3048	2284	3148	2550

<Number of Valid Print Pixels (PP)>

Stamp Character Orientation: Opposite to the film orientation

Film Size	Film Orientation	Modality Mode		CR Mode	
		Horizontal	Vertical	Horizontal	Vertical
14 x 17	PORTRAIT	4306	5248	-	-
	LANDSCAPE	5260	4268	-	-
14 x 14	PORTRAIT	4306	4281	-	-
	LANDSCAPE	4294	4268	-	-
11 x 14	PORTRAIT	3340	4268	-	-
	LANDSCAPE	4306	3327	-	-
10 x 12	PORTRAIT	3008	3632	-	-
	LANDSCAPE	3644	2970	-	-
8 x 10	PORTRAIT	2360	2982	-	-
	LANDSCAPE	2996	2322	-	-

The values in the above table are used as the number of specified input pixels for realizing life size at 78.6µm in a one frame format.

B.2.2.1.2 Extension mode (When the image size is reduced)

<Number of Valid Print Pixels>

Stamp Character Direction: Same as the film direction.

Film Size	Film Orientation	Modality Mode		CR Mode	
		Horizontal	Vertical	Horizontal	Vertical
14 x 17	PORTRAIT	5390	6450	5620	6765
	LANDSCAPE	6636	5286	6765	5620
14 x 14	PORTRAIT	5380	5230	5620	5557
	LANDSCAPE	5430	5286	5557	5620
11 x 14	PORTRAIT	4180	5230	4365	5620
	LANDSCAPE	5428	4094	5620	4365
10 x 12	PORTRAIT	3760	4430	4000	4747
	LANDSCAPE	4618	3664	4747	4000
8 x 10	PORTRAIT	2940	3610	3187	3935
	LANDSCAPE	3808	2854	3935	3187

<Number of Valid Print Pixels>

Stamp Character Direction: Opposite to the film direction.

Film Size	Film Orientation	Modality Mode		CR Mode	
		Horizontal	Vertical	Horizontal	Vertical
14 x 17	PORTRAIT	5382	6560	-	-
	LANDSCAPE	6560	5290	-	-
14 x 14	PORTRAIT	5382	5350	-	-
	LANDSCAPE	5280	5280	-	-
11 x 14	PORTRAIT	4174	5334	-	-
	LANDSCAPE	5320	4100	-	-
10 x 12	PORTRAIT	3760	4540	-	-
	LANDSCAPE	4500	3660	-	-
8 x 10	PORTRAIT	2950	3728	-	-
	LANDSCAPE	3700	2860	-	-

B.2.2.1.3 Method for obtaining the number of valid print pixels

- The number of maximum input pixels in one frame of each format is obtained for each film size and film orientation in the following method.

Printing in Normal Mode (when the image size is not reduced)

Number of maximum input horizontal pixels = $PP - 16 \times (Nh - 1) / Nh$

Number of maximum input vertical pixels = $PP - 16 \times (Nv - 1) / Nv$

Printing in Extension Mode (when the image size is reduced)

Number of maximum input horizontal pixels = $PP - 16 \times (Nh - 1) / Nh / 0.8$

Number of maximum input vertical pixels = $PP - 16 \times (Nv - 1) / Nv / 0.8$

(PP: Number of maximum valid input pixels / Nh: Number of frames in horizontal orientation / Nv: Number of frames in vertical orientation)

- e.g. The number of maximum input pixels in one frame for 14 x 17, 3 x 4 (12 frame format), and portrait orientation is obtained in the following method.

Normal Mode

- Number of maximum input horizontal pixels = $(4344 - 16 \times (3 - 1)) / 3 = 1437$

- Number of maximum input vertical pixels = $(5196 - 16 \times (4 - 1)) / 4 = 1287$

Extension Mode

- Number of maximum input horizontal pixels = $(4344 - 16 \times (3 - 1)) / 3 / 0.8 = 1796$

- Number of maximum input vertical pixels = $(5196 - 16 \times (4 - 1)) / 4 / 0.8 = 1608$

B.2.2.2 Pitch size 43.75µm

B.2.2.2.1 Normal mode (When the image size is not reduced)

<Number of Valid Print Pixels (PP)>

Stamp Character Orientation: Same as the film orientation

Film Size	Film Orientation	Modality Mode		CR Mode	
		Horizontal	Vertical	Horizontal	Vertical
14 x 17	PORTRAIT	7730	9260	8079	9725
	LANDSCAPE	9542	7600	9725	8079
14 x 14	PORTRAIT	7730	7530	8079	7988
	LANDSCAPE	7806	7600	7988	8079
11 x 14	PORTRAIT	6000	7510	6273	8079
	LANDSCAPE	7806	5886	8079	6273
10 x 12	PORTRAIT	5400	6360	5748	6824
	LANDSCAPE	6640	5270	6824	5748
8 x 10	PORTRAIT	4240	5200	4582	5658
	LANDSCAPE	5474	4104	5658	4582

<Number of Valid Print Pixels (PP)>

Stamp Character Orientation: Opposite to the film orientation

Film Size	Film Orientation	Modality Mode		CR Mode	
		Horizontal	Vertical	Horizontal	Vertical
14 x 17	PORTRAIT	7736	9428	-	-
	LANDSCAPE	9390	7610	-	-
14 x 14	PORTRAIT	7650	7600	-	-
	LANDSCAPE	7650	7610	-	-
11 x 14	PORTRAIT	6000	7668	-	-
	LANDSCAPE	7650	5890	-	-
10 x 12	PORTRAIT	5406	6526	-	-
	LANDSCAPE	6480	5270	-	-
8 x 10	PORTRAIT	4240	5360	-	-
	LANDSCAPE	5320	4110	-	-

The values in the above table are used as the number of specified input pixels for realizing life size at 43.75µm in a one frame format.

B.2.2.2.2 Extension mode (When the image size is reduced)

<Number of Valid Print Pixels>

Stamp Character Direction: Same as the film direction.

Film Size	Film Orientation	Modality Mode		CR Mode	
		Horizontal	Vertical	Horizontal	Vertical
14 x 17	PORTRAIT	8610	10310	8976	10806
	LANDSCAPE	10602	8444	10806	8976
14 x 14	PORTRAIT	8610	8380	8976	8876
	LANDSCAPE	8672	8444	8876	8978
11 x 14	PORTRAIT	6670	8350	6968	8978
	LANDSCAPE	8672	6540	8978	6968
10 x 12	PORTRAIT	6020	7090	6386	7580
	LANDSCAPE	7374	5854	7580	6386
8 x 10	PORTRAIT	4720	5780	5090	6284
	LANDSCAPE	6080	4558	6284	5090

<Number of Valid Print Pixels>

Stamp Character Direction: Opposite to the film direction.

Film Size	Film Orientation	Modality Mode		CR Mode	
		Horizontal	Vertical	Horizontal	Vertical
14 x 17	PORTRAIT	8596	10476	-	-
	LANDSCAPE	10420	8440	-	-
14 x 14	PORTRAIT	8596	8545	-	-
	LANDSCAPE	8500	8450	-	-
11 x 14	PORTRAIT	6666	8520	-	-
	LANDSCAPE	8500	6550	-	-
10 x 12	PORTRAIT	6006	7250	-	-
	LANDSCAPE	7200	5860	-	-
8 x 10	PORTRAIT	6006	7250	-	-
	LANDSCAPE	5920	4570	-	-

B.2.2.2.3 Method for obtaining the number of valid print pixels

- The number of maximum input pixels in one frame of each format is obtained for each film size and film orientation in the following method.

Printing in Normal Mode (when the image size is not reduced)

Number of maximum input horizontal pixels = $PP - 29 \times (Nh - 1) / Nh$

Number of maximum input vertical pixels = $PP - 29 \times (Nv - 1) / Nv$

Printing in Extension Mode (when the image size is reduced)

Number of maximum input horizontal pixels = $PP - 29 \times (Nh - 1) / Nh / 0.9$

Number of maximum input vertical pixels = $PP - 29 \times (Nv - 1) / Nv / 0.9$

(PP: Number of maximum valid input pixels / Nh: Number of frames in horizontal orientation / Nv: Number of frames in vertical orientation)

- e.g. The number of maximum input pixels in one frame for 14 x 17, 3 x 4 (12 frame format), and portrait orientation is obtained in the following method.

Normal Mode

- Number of maximum input horizontal pixels = $(7806 - 29 \times (3 - 1)) / 3 = 2582$

- Number of maximum input vertical pixels = $(9336 - 29 \times (4 - 1)) / 4 = 2312$

Extension Mode

- Number of maximum input horizontal pixels = $(7806 - 29 \times (3 - 1)) / 3 / 0.9 = 2868$

- Number of maximum input vertical pixels = $(9336 - 29 \times (4 - 1)) / 4 / 0.9 = 2568$

Appendix.C (Status Information)

C.1 Imager Status Information

NO	Value	Description
1	COVER OPEN	The cover, drawer, or door of the imager is open.
2	ELEC DOWN	The imager cannot operate due to an electrical hardware problem.
3	ELEC SW ERROR	The imager cannot operate due to a software error.
4	EMPTY 8×10	8x10 Film EMPTY
5	EMPTY 8×10 CLR	8x10 Clear Film EMPTY
6	EMPTY 8×10 BLUE	8x10 Blue Film EMPTY
7	EMPTY 8×10 DR B	8x10 DR Blue Film EMPTY
8	EMPTY 10×12	10x12 Film EMPTY
9	EMPTY 10×12 CLR	10x12 Clear Film EMPTY
10	EMPTY 10×12 BLUE	10x12 Blue Film EMPTY
11	EMPTY 10×12 DR B	10x12 DR Blue Film EMPTY
12	EMPTY 11×14	11x14 Film EMPTY
13	EMPTY 11×14 CLR	11x14 Clear Film EMPTY
14	EMPTY 11×14 BLUE	11x14 Blue Film EMPTY
15	EMPTY 11×14 DR B	11x14 DR Blue Film EMPTY
16	EMPTY 14×14	14x14 Film EMPTY
17	EMPTY 14×14 CLR	14x14 Clear Film EMPTY
18	EMPTY 14×14 BLUE	14x14 Blue Film EMPTY
19	EMPTY 14×14 DR B	14x14 DR Blue Film EMPTY
20	EMPTY 14×17	14x17 Film EMPTY
21	EMPTY 14×17 CLR	14x17 Clear Film EMPTY
22	EMPTY 14×17 BLUE	14x17 Blue Film EMPTY
23	EMPTY 14×17 DR B	14x17 DR Blue Film EMPTY
24	EXPOSURE FAILURE	An unknown problem has occurred in the exposure section.
25	FILM JAM	A film jam has occurred in the imager.
26	FILM TRANSP ERR	A film transport error has occurred.
27	CHECK PRINTER	The imager is not ready.
28	PRINTER INIT	The imager is still not ready even after warming up normally.
29	PRINTER DOWM	The imager cannot operate for an unknown reason.
30	UNKNOWN	An unknown problem has occurred.

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