INTERNATIONAL STANDARD

ISO 12231

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Photography — Electronic still picture imaging — Vocabulary

Photographie — Prises de vue électroniques — Vocabulaire

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 12231 was prepared by Technical Committee ISO/TC 42, *Photography*.

This third edition cancels and replaces the second edition (ISO 12231:2005), which has been technically revised.

Introduction

Electronic still picture imaging concepts are drawn from traditional photography, electronics, video, and information technology. In some cases the concepts are redefined to apply to electronic still picture imaging. For example, unlike traditional photography, measurements cannot be defined in terms of “film” or “sensitized material”, since images acquired by digital image capture devices are stored electronically and are not immediately exposed on film. The meaning of shutter and exposure time is also different for digital image capture devices, because an electronic imaging sensor typically has image acquisition characteristics that are different from those of film.

This International Standard provides a vocabulary which standardizes the use and meaning of terms associated with electronic still picture imaging. It is organized alphabetically and follows natural (English) word order wherever possible. The source documents for most of the definitions provided in this International Standard are International Standards on electronic still picture imaging developed by ISO/TC 42 and ISO/TC 130.

Where possible, users are advised to verify if a more recent edition of the source document has been published, which contains an updated version of the term and definition. Future revisions of this International Standard will include updated terms and definitions consistent with the source documents at the time the revision is prepared.

Photography — Electronic still picture imaging — Vocabulary

1 Scope

This International Standard defines terms used in electronic still picture imaging.

Only terms related to electronic still picture imaging are defined. These terms are relevant to current tasks or are of general interest in electronic still picture imaging.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 10918-1, *Information technology — Digital compression and coding of continuous-tone still images: Requirements and guidelines*

ISO 12232, *Photography — Digital still cameras — Determination of exposure index, ISO speed ratings, standard output sensitivity, and recommended exposure index*

ISO 12234-2, *Electronic still-picture imaging — Removable memory — Part 2: TIFF/EP image data format*

ISO 15739, *Photography — Electronic still-picture imaging — Noise measurements*

ISO 21550, *Photography — Electronic scanners for photographic images — Dynamic range measurements*

IEC 61966-2-1, *Multimedia systems and equipment — Colour measurement and management — Part 2-1: Colour management — Default RGB colour space — sRGB*

3 Terms and definitions

3.1
absolute colorimetric coordinates
tristimulus values, or other colorimetric coordinates derived from tristimulus values, where the numerical values correspond to the magnitude of the physical stimulus

EXAMPLE When CIE 1931 standard colour-matching functions are used, the Y-coordinate value corresponds to the luminance, not the luminance factor (or some scaled value thereof).

[ISO 22028-1:2004, definition 3.1]

3.2
adapted white
colour stimulus that an observer who is adapted to the viewing environment would judge to be perfectly achromatic and to have a luminance factor of unity; i.e. absolute colorimetric coordinates that an observer would consider to be a perfect white diffuser

NOTE 1 The adapted white can vary within a scene.

NOTE 2 See also **adopted white** (3.5).

NOTE 3 This term is also defined in ISO 22028-1 and ISO/TS 22028-3.

[ISO/TS 22028-2:2006, definition 3.1]

3.3
additive RGB colour space
colorimetric colour space having three colour primaries (generally red, green and blue) such that CIE XYZ tristimulus values can be determined from the RGB colour space values by forming a weighted combination of the CIE XYZ tristimulus values for the individual colour primaries, where the weights are proportional to the radiometrically linear colour space values for the corresponding colour primaries

NOTE 1 A simple linear 3x3 matrix transformation can be used to transform between CIE XYZ tristimulus values and the radiometrically linear colour space values for an additive RGB colour space.

NOTE 2 Additive RGB colour spaces are defined by specifying the CIE chromaticity values for a set of additive RGB primaries and a colour space white point, together with a colour component transfer function.

NOTE 3 This term is also defined in ISO 22028-1 and ISO/TS 22028-3.

[ISO/TS 22028-2:2006, definition 3.2]

3.4
addressable photoelements
number of active photoelements in an image, which is equal to the number of active lines of photoelements multiplied by the number of active photoelements per line

NOTE 1 It is possible that the number of addressable photoelements may be different for the different colour records of an image. When the signal values of the photoelements are digitized, the digitized code values may be referred to as picture elements, or pixels.

NOTE 2 This term is also defined in ISO 16067-1, ISO 16067-2 and ISO 21550.

[ISO 12233:2000, definition 3.1]

3.5
adopted white
spectral radiance distribution as seen by an image capture or measurement device and converted to colour signals that are considered to be perfectly achromatic and to have an observer adaptive luminance factor of unity, i.e. colour signals that are considered to correspond to a perfect white diffuser

NOTE 1 The adopted white can vary within a scene.

NOTE 2 No assumptions can be made concerning the relation between the adapted or adopted white and measurements of near perfectly reflecting diffusers in a scene, because measurements of such diffusers will depend on the illumination and viewing geometry, and other elements in the scene that can affect perception. It is easy to arrange conditions for which a near perfectly reflecting diffuser will appear to be grey or coloured.

NOTE 3 See also **adapted white** (3.2).

NOTE 4 This term is also defined in ISO 17321-1 and ISO 22028-1.

3.6
album
end-user created object used to logically group data objects according to some user-defined criteria

NOTE An album might or might not be a physical folder in a file system. In this International Standard, an album is a type of association.

[ISO 15740:2008, definition 3.1]

3.7
aliasing
output image artefacts that occur in a sampled imaging system for input images having significant energy at frequencies higher than the Nyquist frequency of the system

NOTE 1 These artefacts usually manifest themselves as moiré patterns in repetitive image features or as jagged “stairstepping” at edge transitions.

NOTE 2 This term is also defined in ISO 12233, ISO 16067-2 and ISO 21550.

[ISO 16067-1:2003, definition 3.2]

3.8
aliasing ratio
value equal to the “maximum minus minimum” modulation divided by the “average” modulation of an electronic still picture camera when imaging a frequency burst of constant spatial frequency

NOTE The aliasing ratio is described in 6.4 of ISO 12233:2000.

[ISO 12233:2000, definition 3.4]

3.9
application
image application software for use on a personal computer

[ISO 12231:2005, definition 3.5]

3.10
Application Programming Interface
API
high-level functional description of a software interface

NOTE 1 An API is typically language-dependent.

NOTE 2 This was taken from ISO 15740:2005, definition 3.2, which has been cancelled and replaced by ISO 15740:2008.

3.11
artefactual attribute
attribute of image quality that, when evident in an image, nearly always leads to a loss of overall image quality

NOTE The commonly used terms *defect* and *impairment* are similar in meaning.

EXAMPLE Examples of artefactual attributes include noise and aliasing.

[ISO 20462-1:2005, definition 3.1, ISO 20462-3:2005, definition 3.1]

3.12 aspect ratio
3.12.1
image aspect ratio
ratio of the image width to the image height

[ISO 12233:2000, definition 3.10, ISO 15740:2008, definition 3.16]

3.12.2
pixel aspect ratio
ratio of the distance between sampling points in the two orthogonal sampling directions

NOTE 1 If the distances are equal, the pixel aspect ratio equals 1:1, and is said to be “square”.

NOTE 2 See also **image aspect ratio** (3.12.1).

[ISO 12231:2005, definition 2.6.2]

3.13
association
logical construct used to expose a relationship between discrete objects

NOTE Associations are used to indicate that separate data objects are related. Associations are represented like folders, and may be nested using a standard branched hierarchical tree structure.

EXAMPLE A time sequence or user-defined groupings by content or capture session.

[ISO 15740:2008, definition 3.2]

3.14
attribute
aspect, dimension, or component of overall image quality

NOTE 1 See also **artefactual attribute** (3.11) and **preferential attribute** (3.138).

NOTE 2 This term is also defined in ISO 20462-1 and ISO 20462-3.

EXAMPLE Examples of image quality attributes include image structure properties such as sharpness and noise; colour and tone reproduction properties such as contrast, colour balance, and relative colourfulness; and digital artefacts such as aliasing, contouring, and compression defects.

3.15
attribute just noticeable difference
attribute JND
measure of the detectability of appearance variations, corresponding to a stimulus difference that would lead to a 75:25 proportion of responses in a paired comparison task in which univariate stimuli pairs were assessed in terms of a single attribute identified in the instructions

NOTE 1 As an example, a paired comparison identifying the sharper of two stimuli that differed only in their generating system modulation transfer function (MTF) would yield results in terms of sharpness attribute JNDs. If the MTF curves differed monotonically and did not cross, the outcome of the paired comparison would depend primarily upon the observers' ability to detect changes in the appearance of the stimuli as a function of MTF variations, with little or no value judgement required of the observers.

NOTE 2 If observers are instead asked to choose which of a pair of stimuli is higher in overall image quality, and if the stimuli in aggregate are multivariate, such that the observer must make value judgements of the importance of a number of attributes, rather than focusing on one aspect of image appearance, it is observed experimentally that larger objective stimulus differences (for example, MTF changes) are required to obtain a 75:25 proportion of responses, which in this case corresponds to a quality JND.

NOTE 3 A JND is a statistical quantity, derived from a number of observations. An observer assessing a single pair of images differing by one attribute JND is unlikely to be confident that he or she has detected the sample difference. A stimulus difference of approximately three JNDs is usually needed for an observer of average sensitivity to feel reasonably certain of his or her assessment.

NOTE 4 See also **quality JND** (3.143).

NOTE 5 Adapted from ISO 20462-1.

3.16
categorical sort method
psychophysical method involving the classification of a stimulus into one of several ordered categories, at least some of which are identified by adjectives or phrases that describe different levels of image quality or attributes thereof

NOTE The application of adjectival descriptors is strongly affected by the range of stimuli presented, so that it is difficult to compare the results of one categorical sort experiment to another. Range effects and the coarse quantization of categorical sort experiments also hinder conversion of the responses to JND units. Given these limitations, it is not possible to unambiguously map adjectival descriptors to JND units, but it is worth noting that in some experiments where a broad range of stimuli have been presented, the categories *excellent, very good, good, fair, poor*, and *not worth keeping* have been found to provide very roughly comparable intervals that average about six quality JNDs in width.

[ISO 20462-1:2005, definition 3.4, ISO 20462-2:2005, definition 2.5]

3.17
colorimetric colour space
colour space having an exact and simple relationship to CIE colorimetric values

NOTE 1 Colorimetric colour spaces include those defined by CIE (e.g. CIE XYZ, CIELAB, CIELUV, etc.), as well as colour spaces that are simple transformations of those colour spaces (e.g. additive RGB colour spaces).

NOTE 2 This term is also defined in ISO/TS 22028-2.

[ISO 22028-1:2004, definition 3.5, ISO/TS 22028-3:2006, definition 3.3]

3.18
colour component transfer function
single variable, monotonic mathematical function applied individually to one or more colour channels of a colour space

NOTE 1 Colour component transfer functions are frequently used to account for the nonlinear response of a reference device and/or to improve the visual uniformity of a colour space.

NOTE 2 Generally, colour component transfer functions will be nonlinear functions such as a power-law (i.e. “gamma”) function or a logarithmic function. However, in some cases a linear colour component transfer function may be used.

[ISO 22028-1:2004, definition 3.6, ISO/TS 22028-2:2006, definition 3.4, ISO/TS 22028-3:2006, definition 3.4]

3.19
colour encoding
generic term for a quantized digital encoding of a colour space, encompassing both colour space encodings and colour image encodings

[ISO 22028-1:2004, definition 3.7, ISO/TS 22028-2:2006, definition 3.5, ISO/TS 22028-3:2006, definition 3.5]

3.20
colour gamut
solid in a colour space, consisting of all those colours that are either: present in a specific scene, artwork, photograph, photomechanical, or other reproduction; or capable of being created using a particular output device and/or medium

NOTE See also **luminance ratio** (3.100).

[ISO 22028-1:2004, definition 3.8, ISO/TS 22028-2:2006, definition 3.6, ISO/TS 22028-3:2006, definition 3.6]

3.21
colour image encoding
digital encoding of the colour values for a digital image, including the specification of a colour space encoding, together with any information necessary to properly interpret the colour values such as the image state, the intended image viewing environment and the reference medium

NOTE 1 In some cases the intended image viewing environment will be explicitly defined for the colour image encoding. In other cases, the intended image viewing environment may be specified on an image-by-image basis using metadata associated with the digital image.

NOTE 2 Some colour image encodings will indicate particular reference medium characteristics, such as a reflection print with a specified density range. In other cases the reference medium will not be applicable, such as with a scene-referred colour image encoding, or will be specified using image metadata.

NOTE 3 Colour image encodings are not limited to pictorial digital images that originate from an original scene, but are also applicable to digital images with content such as text, line art, vector graphics and other forms of original artwork.

[ISO 22028-1:2004, definition 3.9, ISO/TS 22028-2:2006, definition 3.7, ISO/TS 22028-3:2006, definition 3.7]

3.22
colour matching functions
tristimulus values of monochromatic stimuli of equal radiant power

NOTE See also **tristimulus value** (3.186).

[CIE Publication 17.4 (845-03-23), ISO 22028-1:2004, definition 3.10]

3.23
colour rendering
mapping of image data representing the colour-space coordinates of the elements of a scene to output-referred image data representing the colour-space coordinates of the elements of a reproduction

NOTE Colour rendering generally consists of one or more of the following: compensating for differences in the input and output viewing conditions, tone scale and gamut mapping to map the scene colours onto the dynamic range and colour gamut of the reproduction, and applying preference adjustments.

[ISO 22028-1:2004, definition 3.11, ISO/TS 22028-2:2006, definition 3.8, ISO/TS 22028-3:2006, definition 3.8]

3.24
colour re-rendering
mapping of picture-referred image data appropriate for one specified real or virtual imaging medium and viewing conditions to picture-referred image data appropriate for a different real or virtual imaging medium and/or viewing conditions

NOTE Colour re-rendering generally consists of one or more of the following: compensating for differences in the viewing conditions, compensating for differences in the dynamic range and/or colour gamut of the imaging media, and applying preference adjustments.

[ISO 22028-1:2004, definition 3.12]

3.25
colour space
geometric representation of colours in space, usually of three dimensions

[CIE Publication 17.4 (845-03-25), ISO 22028-1:2004, definition 3.13, ISO/TS 22028-2:2006, definition 3.9, ISO/TS 22028-3:2006, definition 3.9]

3.26
colour space encoding
digital encoding of a colour space, including the specification of a digital encoding method, and a colour space value range

NOTE 1 Multiple colour space encodings can be defined based on a single colour space where the different colour space encodings have different digital encoding methods and/or colour space value ranges. (For example, 8-bit sRGB and 10 bit e-sRGB are different colour space encodings based on a particular RGB colour space.)

NOTE 2 This term is also defined in ISO 22028-1, ISO/TS 22028-2 and ISO/TS 22028-3.

3.27
colour space white point
colour stimulus to which colour space values are normalized

NOTE 1 It is not necessary that the colour space white point correspond to the assumed adapted white point and/or the reference medium white point for a colour image encoding.

NOTE 2 This term is also defined in ISO 22028-1.

[ISO/TS 22028-2:2006, definition 3.11, ISO/TS 22028-3:2006, definition 3.11]

3.28 compression
3.28.1
image compression
process that alters the way digital image data is encoded in order to reduce the size of an image file

[ISO 12233:2000, definition 3.11]

3.28.2
sound compression
process of altering the sound data coding in order to reduce the size of a sound file in the electronic still picture camera

NOTE See also sound recording (3.167).

[ISO 12234-1:2007, definition 3.8]

3.29
connection
transport-provided mechanism for establishing paths for transferring data between devices

[ISO 15740:2008, definition 3.3]

3.30
continuous colour space values
real-valued, unbounded colour space values that have not been encoded using a digital encoding method

NOTE This term is also defined in ISO 22028-1.

[ISO/TS 22028-2:2006, definition 3.12, ISO/TS 22028-3:2006, definition 3.12]

3.31
cycles per millimetre
cy/mm
unit used for specifying resolution characteristics in terms of the response of an imaging system to a linear radiance sine wave input, as a function of the frequency of the sine wave

NOTE 1 A range of input sine wave frequencies is obtained in ISO 12233 through the use of a sharp edge target.

NOTE 2 Most pictorial imaging systems exhibit nonlinear behaviour, which can result in the nature of the target affecting the measured resolution characteristics. Distance units other than millimetres are also used.

NOTE 3 This term is also defined in ISO 12233.

3.32
datacode
16-bit unsigned integer whose Most Significant Nibble (4 bits) is used to indicate the category of code and whether the code value is standard or vendor-extended

[ISO 15740:2008, definition 3.4]

3.33
dataset
transport-independent collection of one or more individual data items with known interpretations

NOTE Data sets are not necessarily opaque or atomic to transport implementations.

[ISO 15740:2008, definition 3.6]

3.34
data object
image or other type of data that typically exists in persistent storage of a DSPD or other device

[ISO 15740:2008, definition 3.5]

3.35
design rule for camera filesystem
DCF
standard convention for camera filesystems which specifies the file format, foldering and naming conventions in order to promote file interoperability between conforming digital photography devices

[ISO 15740:2008, definition 3.7]

3.36
device-dependent colour space
colour space defined by the characteristics of a real or idealized imaging device

NOTE Device-dependent colour spaces having a simple functional relationship to CIE colorimetry can also be categorized as colorimetric colour spaces. For example, additive RGB colour spaces corresponding to real or idealized CRT displays can be treated as colorimetric colour spaces.

[ISO 22028-1:2004, definition 3.17]

3.37
device discovery
act of determining the set of all devices present on a particular transport or platform that are physically or logically accessible

[ISO 15740:2008, definition 3.8]

3.38
digital imaging system
system that records and/or produces images using digital data

[ISO 22028-1:2004, definition 3.18, ISO/TS 22028-3:2006, definition 3.13]

3.39
digital output level
digital code value
numerical value assigned to a particular output level

NOTE This term is also defined in ISO 16067-2 and ISO 21550.

[ISO 14524:2009, definition 3.2, ISO 15739:2003, definition 3.2, ISO 16067-1:2003, definition 3.3]

3.40
digital still camera
DSC
device which incorporates an image sensor and produces a digital signal representing a still picture

NOTE 1 A digital still camera is typically a portable, hand-held device. The digital signal is usually recorded on a removable memory, such as a solid-state memory card or magnetic disk.

NOTE 2 This term is also defined in ISO 12232, ISO 15739 and ISO 17321-1.

3.41
digital print order format
DPOF
standardized ASCII file stored on removable media along with the image files that indicates how many copies of which images should be printed

NOTE DPOF also allows index prints, cropping, and text overlays to be specified.

[ISO 15740:2008, definition 3.10]

3.42
digital still photography device
DSPD
device with persistent storage that captures a two-dimensional digital still image

[ISO 15740:2008, definition 3.9]

3.43
edge spread function
ESF
normalized spatial signal distribution in the linearized output of an imaging system resulting from imaging a theoretical infinitely sharp edge

NOTE See also **line spread function** (3.94), **point spread function** (3.136).

[ISO 12233:2000, definition 3.5, ISO 16067-1:2003, definition 3.4, ISO 16067-2:2004, definition 3.4, ISO 21550:2004, definition 3.4]

3.44
effectively spectrally neutral
having spectral characteristics which result in a specific imaging system producing the same output as for a spectrally neutral object

NOTE 1 See also **spectrally neutral** (3.169).

NOTE 2 This term is also defined in ISO 21550.

[ISO 12233:2000, definition 3.6, ISO 16067-1:2003, definition 3.5, ISO 16067-2:2004, definition 3.5]

3.45
electronic scanner for photographic films
scanner incorporating an image sensor that outputs a digital signal representing a still film image

NOTE This term is also defined in ISO 21550.

[ISO 16067-2:2004, definition 3.6]

3.46
electronic scanner for photographic prints
scanner incorporating an image sensor that outputs a digital signal representing a still print image

[ISO 16067-1:2003, definition 3.6]

3.47
electromechanical shutter
mechanical shutter which is electronically controlled

[ISO 14524:2009, definition 3.3]

3.48
electronic still-picture camera
camera incorporating an image sensor that outputs an analogue or digital signal representing a still-picture, or records an analog or digital signal representing a still picture on a removable media, such as a memory card or magnetic disk

NOTE This term is also defined in ISO 14524 and ISO 15739.

[ISO 12233:2000, definition 3.7]

3.49
enumeration
act of creating an ordered increasing numerical list that contains one representative element for each member of a set

[ISO 15740:2008, definition 3.11]

3.50
Exif/JPEG
compressed file format for digital cameras in which the images are compressed using the baseline JPEG standard described in ISO 12234-2

NOTE In Exif, metadata and thumbnail images are stored using TIFF tags within an application segment at the beginning of the JPEG file.

[ISO 15740:2008, definition 3.12]

3.51
exposure index
EI
numerical value that is inversely proportional to the exposure provided to an image sensor to obtain an image

NOTE Images obtained from a DSC using a range of exposure index values will normally provide a range of image quality levels.

[ISO 12232:2006, definition 3.2]

3.52
exposure process
various methods to capture images in the electronic still picture camera

3.52.1
single exposure
acquisition of a picture by a single exposure, with one or more image sensors, that exposes all sensor pixels, all colours, and all image locations at the same time

3.52.2
colour sequential exposure
acquisition of a picture by combining repeated exposures to capture different colour components

NOTE Colour sequential exposure can be by means of three colour illuminations, or by three colour filters.

3.52.3
time sequential exposure
acquisition of a picture by combining repeated exposures to capture different spatial components

NOTE Time sequential exposure can be with a line array (line scanning) or an area array. With a line array, the picture is acquired by optical or physical sub-scanning with an image sensor in one dimension. With an area array, repeated exposures may integrate smaller pictures into a larger picture by means of image sensor shifting.

3.53
exposure series
series of images of the same subject taken using different exposure index values

[ISO 12232:2006, definition 3.3]

3.54
extended gamut
colour gamut extending outside that of the standard sRGB CRT display as defined by IEC 61966-2-1

[ISO 22028-1:2004, definition 3.19, ISO/TS 22028-2:2006, definition 3.13, ISO/TS 22028-3:2006, definition 3.14]

3.55
fast scan direction
scan direction corresponding to the direction of the alignment of the addressable photoelements in a linear array image sensor

[ISO 16067-1:2003, definition 3.7, ISO 16067-2:2004, definition 3.7, ISO 21550:2004, definition 3.7]

3.56
file system
filing system
software structure which specifies how the data are logically organized on a given storage medium

NOTE This term is also defined in ISO 12234-1 and ISO 12234-2.

3.57
film rendering transform
mapping of image data representing measurements of a photographic negative to output-referred image data representing the colour-space coordinates of the elements of a reproduction

[ISO 22028-1:2004, definition 3.20]

3.58
film unrendering transform
mapping of image data representing measurements of a photographic negative to scene-referred image data representing estimates of the colour-space coordinates of the elements of the original scene

[ISO 22028-1:2004, definition 3.21]

3.59
flare
light falling on an image, in an imaging system, which does not emanate from the subject point

NOTE 1 Flare is also sometimes referred to as veiling glare.

NOTE 2 See also **image flare** (3.59.1), **veiling flare** (3.59.2), **veiling glare** (3.189).

3.59.1
image flare
light from a subject point that is scattered by the optical system to areas of the image plane other than the appropriate image point

NOTE The distinction of image-flare light resulting from any subject point is specified by the image point spread function. Point spread functions tend to fall off rapidly as the distance from the image point is increased, are variable for different image-point locations and are typically not radially symmetric for image points some distance from the optical systems axis.

3.59.2
veiling flare
relatively uniform but unwanted irradiation in the image plane of an optical system, caused by the scattering and reflection of a proportion of the radiation which enters the system through its normal entrance aperture where the radiation may be from inside or outside the field of view of the system

NOTE Light leaks in an optical system housing can cause additional unwanted irradiation of the image plane. This irradiation can resemble veiling flare.

[ISO 3664:2009, definition 3.19]

3.60
FlashPix
image file format, defined in *FlashPix Format Specification*, using a structured storage file containing metadata and a tiled, hierarchical image representation

NOTE The tiles in a *FlashPix* image are normally baseline JPEG images, and individual image tiles of a particular resolution can be easily accessed for rapid display and editing.

[ISO 15740:2008, definition 3.14]

3.61
folder
optional sub-structure in a hierarchical storage area that can contain data objects

[ISO 15740:2008, definition 3.13]

3.62
gamma correction
process that alters the image data in order to modify the tone reproduction

NOTE 1 Gamma correction is performed in part to correct for the nonlinear light-output versus signal input characteristic of the display. The relationship between the light input level and the output signal level, called the OECF, provides the gamma correction curveshape for an image capture device.

NOTE 2 The gamma correction is usually an algorithm, lookup table, or circuit which operates separately on each colour component of an image.

NOTE 3 This term is also defined in ISO 12233, ISO 16067-1, ISO 16067-2 and ISO 21550.

3.63
gamut mapping
mapping of the colour-space coordinates of the elements of a source image to colour-space coordinates of the elements of a reproduction to compensate for differences in the source and output medium colour gamut capability

NOTE The term “gamut mapping” is somewhat more restrictive than the term “colour rendering” because gamut mapping is performed on colorimetry that has already been adjusted to compensate for viewing condition differences and viewer preferences, although these processing operations are frequently combined in reproduction and preferred reproduction models.

[ISO 22028-1:2004, definition 3.22, ISO/TS 22028-2:2006, definition 3.14]

3.64
hardcopy
representation of an image on a substrate which is self-sustaining and reasonably permanent

EXAMPLE Prints, transparencies.

NOTE See also **softcopy** (3.166).

[ISO 3664:2009, definition 3.4, ISO 22028-1:2004, definition 3.23]

3.65
horizontal resolution
resolution value measured in the longer image dimension, corresponding to the horizontal direction for a “landscape” image orientation, typically using a vertically oriented test-chart feature

[ISO 12233:2000, definition 3.9]

3.66
ICC profile
International Color Consortium’s file format, used to store transforms from one colour encoding to another, e.g. from device colour coordinates to profile connection space, as part of a colour management system

[ISO 22028-1:2004, definition 3.24]

3.67
IEEE 1394
high-speed serial bus standardized by the IEEE (Institute of Electrical and Electronics Engineers) currently having clock rates of 100, 200 and 400 Mbits/sec

NOTE IEEE 1394 is often referred to as FireWire.

[ISO 15740:2008, definition 3.17]

3.68
illuminance scale exposure series
series of exposures produced using a constant exposure time and a varying focal plane illuminance

NOTE See also **time scale exposure series** (3.181).

[ISO 14524:2009, definition 3.6]

3.69
image capture device
device for converting a scene or a fixed image such as a print, film or transparency, to digital image data

[ISO 15740:2008, definition 3.17]

3.70
image compression
process that alters the way digital image data is encoded in order to reduce the size of an image file

[ISO 12233:2000, definition 3.11]

3.71
image data format
structure and content which specify image and the organization of the image related data in a device independent manner

NOTE This term is also defined in ISO 12234-2.

[ISO 12234-1:2007, definition 3.2]

3.72
image output device
device that can render a digital image to hardcopy or softcopy media

[ISO 15740:2008, definition 3.18]

3.73
image quality
impression of the overall merit or excellence of an image, as perceived by an observer neither associated with the act of photography, nor closely involved with the subject matter depicted

NOTE The purpose of defining image quality in terms of third-party (uninvolved) observers is to eliminate sources of variability that arise from more idiosyncratic aspects of image perception and pertain to attributes outside the control of imaging system designers.

[ISO 20462-1:2005, definition 3.5, ISO 20462-3:2005, definition 3.3]

3.74
image sensor
electronic device that converts an optical image into an electronic signal; for example a charge coupled device (CCD) array

NOTE This term is also defined in ISO 12232, ISO 15739, ISO 16067-1, ISO 16067-2 and ISO 21550.

[ISO 12233:2000, definition 3.12]

3.75
image state
attribute of a colour image encoding indicating the rendering state of the image data

NOTE The primary image states defined in this document are the scene-referred image state, the original-referred image state and the output-referred image state.

[ISO 22028-1:2004, definition 3.25, ISO/TS 22028-2:2006, definition 3.16, ISO/TS 22028-3:2006, definition 3.15]

3.76
image storage application profile
ISAP
media profile, the filing system and the image data format

NOTE The ISAP specifies all the information necessary to completely implement the removable memory.

[ISO 12234-1:2007, definition 3.3]

3.77
in-band event
event transmitted on the same logical connection as operations and responses

NOTE Events are only asynchronous to the degree of data precision for which the transport implementation allows event interleaving.

[ISO 15740:2008, definition 3.19]

3.78
incremental gain function
change in the output level (digital code value) divided by the change in the input level (luminance or exposure) as a function of input level

NOTE 1 For the determination of incremental gain values, log input values are not used.

NOTE 2 If the input exposure points are very finely spaced and the output noise is small compared to the quantization interval, the incremental gain function may have a jagged shape. Such behaviour is an artefact of the quantization process and should be removed by using an appropriate smoothing algorithm, or by fitting a smooth curve to the data. In some cases, it may be desirable to fit a curve to the input-output data and then determine the incremental gain function by taking the first derivative of the function used for the curve fit.

NOTE 3 This term is also defined in ISO 15739 and ISO 21550.

[ISO 14524:2009, definition 3.7]

3.79
incremental output signal
input level (luminance or exposure, not logged) multiplied by the system incremental gain at that level

NOTE 1 See also **incremental gain function** (3.78).

NOTE 2 This term is also defined in ISO 21550.

[ISO 14524:2009, definition 3.8, ISO 15739:2003, definition 3.7]

3.80
incremental signal-to noise ratio
ratio of the incremental output signal to the root mean square (rms) noise level, at a particular signal level

NOTE 1 The incremental signal to noise ratio is typically expressed as a graph or table showing the rms noise level versus output signal level for the full range of output signal levels.

NOTE 2 This term is also defined in ISO 15739 and ISO 21550.

3.81
Infrared Data Association
IrDA
infrared wireless communication system that currently supports wireless communication at data rates between 9600 bps and 4 Mbps

[ISO 15740:2008, definition 3.22]

3.82
initiator
device that initiates a conversation by opening a session, and issues all formal operations to the responder

NOTE The initiator is analogous to the client in the client/server paradigm.

[ISO 15740:2008, definition 3.20]

3.83
instructions
set of directions given to the observer for performing the psychophysical evaluation task

[ISO 20462-1:2005, definition 3.6, ISO 20462-3:2005, definition 3.4]

3.84
International Color Consortium profile connection space (ICC PCS)
standard colour image encoding defined by the International Color Consortium providing a standard connection point for combining ICC profiles

NOTE The ICC.1:2001 specification defines two variations of the PCS, an original-referred variation for colorimetric intent profiles, and a standard output-referred variation for perceptual intent profiles.

[ISO 22028-1:2004, definition 3.26]

3.85
International Imaging Industry Association
I3A
organization that serves to represent the common interests among manufacturers of imaging technology products

NOTE See http://www.i3a.org.

[ISO 15740:2008, definition 3.21]

3.86
ISO DSC dynamic range
ratio of the maximum luminance level that appears unclipped to the minimum luminance level that can be reproduced with an incremental signal-to-temporal-noise ratio of at least 1, as determined according to ISO 15739

[ISO 15739:2003, definition 3.9]

3.87
ISO scanner dynamic range
difference of the maximum density where the incremental gain is higher than 0,5, as determined according to ISO 21550, and the minimum density that appears unclipped

[ISO 21550:2004, definition 3.13]

3.88
ISO speed
numerical value calculated from the exposure provided at the focal plane of a DSC to produce specified camera output signal characteristics using the methods described in ISO 12232

NOTE 1 The ISO speed is usually the highest exposure index value that still provides peak image quality for normal scenes. However, a DSC does not necessarily use the ISO speed value as the exposure index value when capturing images.

NOTE 2 This term is also defined in ISO 12232.

3.89
ISO speed latitude
set of two numerical values calculated from the exposure provided at the focal plane of an electronic camera to produce specified camera output signal characteristics using the methods described in ISO 12232

NOTE 1 The ISO speed latitude is expected to correlate with the range of exposure index values that provide acceptable image quality for normal scenes.

NOTE 2 This term is also defined in ISO 12232.

3.90
Joint Photographic Experts Group
JPEG
specific image compression method defined in ISO/IEC 10918-1

[ISO 15740:2008, definition 3.23]

3.91
just noticeable difference
JND
stimulus difference that leads to a 75:25 proportion of responses in a paired comparison task

NOTE 1 See also **attribute JND** (3.15) and **quality JND** (3.143).

NOTE 2 This term is also defined in ISO 20462-3.

[ISO 20462-1:2005, definition 3.7]

3.92
limiting resolution
value of that portion of a specified resolution test pattern, measured in line widths per picture height, which corresponds to an average modulation value equal to some specified percentage of the modulation value at a specified reference frequency

EXAMPLE The limiting resolution could be the test pattern value, in line widths per picture height (LW/PH), corresponding to a camera output modulation level of 5 % of the camera output modulation level at a reference frequency of 10 LW/PH.

NOTE This term is also defined in ISO 12233.

3.93
line pairs per millimetre
lp/mm
metric for specifying resolution in terms of the number of equal width black and white line pairs per millimetre that can be resolved according to some criterion, such as visual resolution or limiting resolution

NOTE 1 Distance units other than millimetres can also be used.

NOTE 2 This term is also defined in ISO 12233.

3.94
line spread function
LSF
normalized spatial signal distribution in the linearized output of an imaging system resulting from imaging a theoretical infinitely thin line

NOTE If the imaging system is operating in an isoplanatic region and in its linear range, the LSF is equal to the first derivative of the ESF.

[ISO 12233:2000, definition 3.16]

3.95
LogicalStorageID
least significant sixteen bits of a Storage ID

NOTE This value uniquely identifies one logical storage area within the physical store indicated in the PhysicalStorageID.

[ISO 15740:2008, definition 3.24]

3.96
line widths per picture height
LW/PH
metric for specifying the width of a feature on a test chart, relative to the height of the active area of the chart, which is equal to the height of the active area of the test chart divided by the width of a black line that is equal to the total number of lines of the same width which can be placed edge to edge within the height of a test target, or within the vertical field of view of a camera

NOTE If the height of the active area of the chart equals 20 cm, a black line of 1 000 LW/PH has a width equal to 20/1 000 cm.

[ISO 12233:2000, definition 3.17]

3.97
linearized
digital signal conversion performed to invert the camera opto-electronic conversion function (OECF) so that the resulting signal is approximately linearly proportional to the scene luminance

[ISO 12233:2000, definition 3.18]

3.98
lines per millimetre
lines/mm
metric for specifying resolution in terms of the number of equal-width black and white lines per millimetre that can be resolved according to some criterion, such as visual resolution or limiting resolution

NOTE 1 Distance units other than millimetres can also be used.

NOTE 2 This term is also defined in ISO 12233.

3.99
luminance factor
ratio of the luminance of the surface element in the given direction to that of a perfect reflecting or transmitting diffuser identically illuminated

NOTE See also **luminance ratio** (3.100).

[CIE 17.4 (845-04-69), ISO 22028-1:2004, definition 3.27, ISO/TS 22028-2:2006, definition 3.17, ISO/TS 22028-3:2006, definition 3.16]

3.100
luminance ratio
ratio of the maximum luminance to the minimum luminance that is either: present in a specific scene, artwork, photograph, photomechanical, or other reproduction; or is capable of being created using a particular output device and medium

NOTE See also **colour gamut** (3.20).

[ISO 22028-1:2004, definition 3.28]

3.101
magnitude estimation method
psychophysical method involving the assignment of a numerical value to each test stimulus that is proportional to image quality; typically, a reference stimulus with an assigned numerical value is present to anchor the rating scale

NOTE The numerical scale resulting from a magnitude estimation experiment is usually assumed to constitute a ratio scale, which, ideally, is a scale in which a constant percentage change in value corresponds with one JND. In practice, modest deviations from this behaviour occur, complicating the transformation of the rating scale into units of JNDs without inclusion of unidentified reference stimuli (having known quality) among the test stimuli.

[ISO 20462-1:2005, definition 3.8, 20462-3:2005, definition 3.6]

3.102
maximum exposure limit
smallest exposure which produces the digital output level corresponding to the maximum detectable exposure

NOTE 1 The maximum detectable exposure is also known as the saturation or quantization ceiling.

NOTE 2 See also **minimum exposure limit** (3.109).

[ISO 14524:2009, definition 3.9]

3.103
media profile
portion of the memory module specification which is specific to a given memory technology; including the form factor, interconnection and access protocol

NOTE See also **image storage application profile** (3.76), **image data format** (3.71).

[ISO 12234-1:2007, definition 3.4]

3.104
medium black point
neutral colour with the lowest luminance that can be produced by an imaging medium in normal use, measured using the specified measurement geometry

NOTE It is generally desirable to specify a medium black point that has the same chromaticity as the medium white point.

[ISO 22028-1:2004, definition 3.29, ISO/TS 22028-2:2006, definition 3.18]

3.105
medium white point
neutral colour with the highest luminance that can be produced by an imaging medium in normal use, measured using the specified measurement geometry

[ISO 22028-1:2004, definition 3.30, ISO/TS 22028-2:2006, definition 3.19]

3.106
memory card
specific type of memory module with a physical form factor no larger than that of a credit card in outline and approximately 85 mm x 55 mm in size

[ISO 12234-1:2007, definition 3.5]

3.107
memory module
physical implementation of the removable memory, containing the image data format combined with a specified physical form factor, interconnect definition and access protocol

[ISO 12234-1:2007, definition 3.6]

3.108
metadata
data associated with a digital image aside from the pixel values that comprise the digital image

NOTE Metadata are typically stored as tags in the digital image file.

[ISO 22028-1:2004, definition 3.31]

3.109
minimum exposure limit
largest exposure below saturation which produces an incremental output signal equal in magnitude to the output noise

NOTE See also **incremental output signal** (3.79), **maximum exposure limit** (3.102), **output noise** (3.128).

[ISO 14524:2009, definition 3.10]

3.110
modulation
difference between the minimum and maximum signal levels divided by the sum of these levels

[ISO 12233:2000, definition 3.19]

3.111
modulation transfer function
MTF
modulus of the optical transfer function

NOTE See also **optical transfer function** (2.122), **spatial frequency response** (2.168).

[ISO 12233:2000, definition 3.20]

3.112
most significant nibble
MSN
most-significant four bits of the most-significant byte

[ISO 15740:2008, definition 3.25]

3.113
multivariate
describing a series of test or reference stimuli that vary in multiple attributes of image quality

[ISO 20462-1:2005, definition 3.9, ISO 20462-3:2005, definition 3.7]

3.114
noise
unwanted variations in the response of an imaging system

[ISO 15739:2003, definition 3.10, ISO 21550:2004, definition 3.14]

3.114.1
total noise
all the unwanted variations captured by a single exposure

[ISO 15739:2003, definition 3.10.1]

3.114.2
fixed pattern noise
unwanted variations which are consistent for every exposure

[ISO 15739:2003, definition 3.10.2]

3.114.3
temporally varying noise
random noise due to sensor dark current, photon shot noise, analogue processing, and quantization, that varies from one image to the next

[ISO 15739:2003, definition 3.10.3]

3.115
noise spectral power distribution
curve or equation that expresses the camera output noise as a function of two-dimensional image spatial frequencies

[ISO 15739:2003, definition 3.11]

3.116
normalized spatial frequency
unit used for expressing spatial frequency response, where the distance dimension has been removed by multiplying the spatial frequency in cycles per millimetre by the sampling period in millimetres

NOTE Normalized spatial frequency is particularly appropriate for comparing the spatial frequency response of imaging systems where the rendering magnification is unknown, and the total number of samples is equal.

[ISO 12233:2000, definition 3.21]

3.117
Nyquist limit
spatial frequency equal to 1/2 times the inverse of the sampling period

NOTE Energy at an input spatial frequency above the Nyquist limit will alias to a spatial frequency below the Nyquist limit in the output image. The Nyquist limit may be different in the two orthogonal directions.

[ISO 12233:2000, definition 3.22]

3.118
object aggregation
act of taking one or more location-specific lists of objects that exist on a particular device and grouping them together in one set

[ISO 15740:2008, definition 3.26]

3.119
ObjectHandle
device-unique 32-bit unsigned integer assigned by a device to each data object in local persistent storage which is provided to external devices

NOTE External recipients of an ObjectHandle must use it to reference that piece of data in subsequent transactions. ObjectHandles are guaranteed to be persistent over at least a session.

[ISO 15740:2008, definition 3.27]

3.120
observer
individual performing the subjective evaluation task in a psychophysical method

[ISO 20462-1:2005, definition 3.10, ISO 20462-2:2005, definition 2.6, ISO 20462-3:2005, definition 3.8]

3.121
observer adaptive luminance factor
ratio of the luminance of a stimulus to the luminance of a stimulus that an observer adapted to the viewing environment would interpret to be a perfect white diffuser

[ISO/TS 22028-3:2006, definition 3.17]

3.122
optical transfer function
OTF
two-dimensional Fourier transform of the imaging system's point spread function

NOTE 1 For the OTF to have significance, it is necessary that the imaging system be operating in an isoplanatic region and in its linear range.

NOTE 2 The OTF is a complex function whose modulus has unity value at zero spatial frequency.

NOTE 3 See also **modulation transfer function** (3.111) and **spatial frequency response** (3.168).

[ISO 12233:2000, definition 3.23]

3.123
opto-electronic conversion function
OECF
relationship between the log of the input levels and the corresponding digital output levels for an opto-electronic digital image capture system

NOTE If the input log exposure points are very finely spaced and the output noise is small compared to the quantization interval, the OECF may have a step-like character. Such behaviour is an artefact of the quantization process and should be removed by using an appropriate smoothing algorithm or by fitting a smooth curve to the data.

[ISO 14524:2009, definition 3.11, ISO 17321-1:2006, definition 3.3]

3.123.1
camera opto-electronic conversion function
camera OECF
relationship between the input scene log luminances and the digital output levels for an opto-electronic digital image capture system

NOTE 1 The units of measurement for this function are $\log_{10}$ candelas per square metre.

NOTE 2 This term is also defined in ISO 15739.

[ISO 14524:2009, definition 3.1]

3.123.2
focal plane opto-electronic conversion function
focal plane OECF
relationship between the input focal plane log exposures and the digital output levels for an opto-electronic digital image capture system

NOTE The units of measurement for this function are $\log_{10}$ lux-seconds.

[ISO 14524:2009, definition 3.5]

3.124
opto-electronic digital image capture system
system which converts either a light exposure at the focal plane, or a spatial arrangement of luminances (a scene) to digital information

[ISO 14524:2009, definition 3.12]

3.125
original-referred image state
image state associated with image data that represents the colour-space coordinates of the elements of a two-dimensional hardcopy or softcopy image, typically produced by scanning artwork, photographic transparencies or prints, or photomechanical or other reproductions

NOTE 1 When the phrase "original-referred" is used as a qualifier to an object, it implies that the object is in an original-referred image state. For example, original-referred image data are image data in an original-referred image state.

NOTE 2 Original-referred image data are related to the colour-space coordinates of the original, typically measured according to ISO 13655, and do not include any additional veiling glare or other flare.

NOTE 3 The characteristics of original-referred image data that most generally distinguish them from scene-referred image data are that they refer to a two-dimensional surface, and the illumination incident on the two-dimensional surface is assumed to be uniform (or the image data corrected for any non-uniformity in the illumination).

NOTE 4 There are classes of originals that produce original-referred image data with different characteristics. Examples include various types of artwork, photographic prints, photographic transparencies, emissive displays, etc. When selecting a colour re-rendering algorithm, it is usually necessary to know the class of the original in order to determine the appropriate colour re-rendering to be applied. For example, a colorimetric intent is generally applied to artwork, while different perceptual algorithms are applied to produce photographic prints from transparencies, or newsprint reproductions from photographic prints. In some cases the assumed viewing conditions are also different between the original classes, such as between photographic prints and transparencies, and will usually be considered in well-designed systems.

NOTE 5 In a few cases, it may be desirable to introduce slight colorimetric errors in the production of original-referred image data, for example to make the gamut of the original more closely fit the colour space, or because of the way the image data were captured (such as a Status A densitometry-based scanner).

[ISO 22028-1:2004, definition 3.32]

3.126
out-of-band event
event transmitted on a different logical connection to that for operations and responses

NOTE Out-of-band events are asynchronous from operation transactions.

[ISO 15740:2008, definition 3.28]

3.127
output-referred image state
image state associated with image data that represents the colour-space coordinates of the elements of an image that has undergone colour-rendering appropriate for a specified real or virtual output device and viewing conditions

NOTE 1 When the phrase “output-referred” is used as a qualifier to an object, it implies that the object is in an output-referred image state. For example, output-referred image data are image data in an output-referred image state.

NOTE 2 Output-referred image data are referred to the specified output device and viewing conditions. A single scene can be colour-rendered to a variety of output-referred representations depending on the anticipated output-viewing conditions, media limitations, and/or artistic intents.

NOTE 3 Output-referred image data can become the starting point for a subsequent reproduction process. For example, sRGB output-referred image data are frequently considered to be the starting point for the colour re-rendering performed by a printer designed to receive sRGB image data.

NOTE 4 This term is also defined in ISO 22028-1, ISO/TS 22028-2 and ISO/TS 22028-3.

3.128
output noise
root-mean-square fluctuation about mean in the digital output level for a constant input level

[ISO 14524:2009, definition 3.13]

3.129
paired comparison method
psychophysical method involving the choice of which of two simultaneously presented stimuli exhibits greater or lesser image quality or an attribute thereof, in accordance with a set of instructions given to the observer

NOTE 1 Two limitations of the paired comparison method are as follows.

a) If all possible stimulus comparisons are done, as is usually the case, a large number of assessments are required for even modest numbers of experimental stimulus levels (if N levels are to be studied, N (N-1)/2 paired comparisons are needed).

b) If a stimulus difference exceeds approximately 1.5 JNDs, the magnitude of the stimulus difference cannot be directly estimated reliably because the response saturates as the proportions approach unanimity.

However, if a series of stimuli having no large gaps are assessed, the differences between more widely separated stimuli can be deduced indirectly by summing smaller, reliably determined (unsaturated) stimulus differences. The standard methods for transformation of paired comparison data to an interval scale (a scale linearly related to JNDs) perform statistically optimized procedures for inferring the stimulus differences, but they can yield unreliable results when saturated responses are included in the analysis.

NOTE 2 This term is also defined in ISO 20462-1, ISO 20462-2 and ISO 20462-3.

3.130
Personal Computer
PC
any personal computing device, which may employ various hardware architectures and operating systems

[ISO 15740:2008, definition 3.29]

3.131
photography
acquisition, processing or reproduction of optically formed images using chemical or electronic technologies

3.132
photosite integration time
total time period during which the photosites of an image sensor are able to integrate the light from the scene to form an image

[ISO 12232:2006, definition 3.7, ISO 15739:2003, definition 3.12]

3.133
PhysicalStorageID
most significant sixteen bits of a StorageID

NOTE 1 This value uniquely identifies one physical storage area on a device, although there can be more than one logical store per physical store.

NOTE 2 This term is also defined in ISO 15740.

3.134 Picture formats formed by video signals
3.134.1
field
⟨interlaced video signal⟩ assembly of alternate (odd or even) lines of a frame

NOTE 1 An interlaced frame is composed of two fields, an odd field and an even field, representing the odd- and even-numbered lines respectively.

NOTE 2 Adapted from ISO/IEC 13818-2:2000.

3.134.2
frame (1)
⟨progressive video⟩ lines of spatial information of a video signal, containing samples starting from one time instant and continuing through successive lines to the bottom of the frame

NOTE Adapted from ISO/IEC 13818-2:2000.

3.134.3
frame (2)
⟨interlaced video⟩ lines of spatial information of a video signal, consisting of an odd field and an even field, one of which will commence one field period later than the other

NOTE Adapted from ISO/IEC 13818-2:2000.

3.135
picture-referred image state
image state associated with image data that represents the colour-space coordinates of the elements of a hardcopy or softcopy image, encompassing both original-referred image data and output-referred image data

NOTE 1 When the phrase “picture-referred” is used as a qualifier to an object, it implies that the object is in a picture-referred image state. For example, picture-referred image data are image data in a picture-referred image state.

NOTE 2 Picture-referred image data will generally be colour-rendered for a specific real or virtual imaging medium and viewing condition.

NOTE 3 Picture-referred image data can include image data that do not originate from an original scene, such as text, line art, vector graphics and other forms of original artwork.

[ISO 22028-1:2004, definition 3.34]

3.136
point spread function
PSF
normalized spatial signal distribution in the linearized output of an imaging system resulting from imaging a theoretical infinitely small point source

[ISO 12233:2000, definition 3.24]

3.137
portable network graphics
PNG
extensible file format for lossless, portable, compressed storage of raster images

NOTE PNG supports indexed-colour, greyscale, true colour and an optional alpha channel.

[ISO 15740:2008, definition 3.31]

3.138
preferential attribute
attribute of image quality that is invariably evident in an image, and for which the preferred degree is a matter of opinion, depending upon both the observer and the image content

EXAMPLE Examples of preferential image quality attributes include colour and tone reproduction properties such as contrast and relative colourfulness. Because the perceived quality associated with a preferential attribute is dependent upon both the observer and image content, in studies involving variations of preferential attributes, particular care is needed in the selection of representative sets of stimuli and groups of observers.

NOTE The term *noticeable* in just noticeable difference is not linguistically strictly correct when applied to a preferential attribute, but is nonetheless retained in this document for convenience. For example, the higher contrast stimulus of a pair differing only in contrast might be readily identified by all observers, whereas there might be a lack of consensus regarding which of the two images was higher in overall image quality. Nonetheless, if the responses from the paired comparison for quality were in the proportion of 75:25, the image chosen more frequently would be said to be one JND higher in quality. The JND is best regarded as a measurement unit tied to the predicted or measured outcome of a paired comparison.

[ISO 20462-1:2005, definition 3.12, ISO 20462-3:2005, definition 3.10]

3.139
protocol
defined mechanisms for exchanging data between devices

[ISO 15740:2008, definition 3.32]

3.140
psychophysical method
experimental technique for subjective evaluation of image quality or attributes thereof, from which stimulus differences in units of JNDs may be estimated

NOTE 1 See also **categorical sort method** (3.16), **magnitude estimation method** (3.101), **paired comparison method** (3.129), **quality ruler method** (3.144), **rank ordering method** (3.146), **triplet comparison** (3.185).

NOTE 2 This term is also defined in ISO 20462-1, ISO 20462-2 and ISO 20462-3.

3.141
pull model
use paradigm for DSPDs where the object receiver initiates the operation requests to transfer data objects from the sender

[ISO 15740:2008, definition 3.33]

3.142
push model
use paradigm for DSPDs where the object sender initiates the operation requests to transfer data objects to the receiver

[ISO 15740:2008, definition 3.34]

3.143
quality just noticeable difference
quality JND
measure of the significance or importance of quality variations, corresponding to a stimulus difference that leads to a 75:25 proportion of responses in a paired comparison task in which multivariate stimuli pairs were assessed in terms of overall image quality

NOTE 1 The attribute JND is a measure of detectability of appearance changes, whereas the quality JND is a measure of significance or importance of stimulus differences in terms of their impact on quality. An attribute JND is a useful unit for predicting how observers would react to an advertisement showing images carefully matched in all respects but one, and drawing the attention of the observer to the attribute varying. In contrast, a quality JND is useful for predicting how observers would perceive overall quality as a function of one or more stimulus variations, and so is a more useful quantity in optimizing imaging system design, where different attributes should be balanced against one another. The overall quality of an image may be predicted from a knowledge of the impact of each attribute in isolation, expressed in terms of quality JNDs, whereas the same is not true of attribute JNDs. Therefore, it is often highly desirable to obtain results expressed in quality JNDs, even if the stimuli being assessed are univariate in nature. This can be accomplished if test stimuli are rated against a series of appropriately calibrated reference stimuli, as in the quality ruler method.

NOTE 2 See also **attribute JND** (3.15).

NOTE 3 This term is also defined in ISO 20462-3.

[ISO 20462-1:2005, definition 3.14]

3.144
quality ruler method
psychophysical method that involves quality or attribute assessment of a test stimulus against a series of ordered, univariate reference stimuli that differ by known numbers of JNDs

NOTE The quality ruler method is described in more detail in ISO 20462-3.

[ISO 20462-1:2005, definition 3.15, ISO 20462-3:2005, definition 3.13]

3.145
QuickDraw picture
file format consisting of sequences of saved drawing commands

NOTE QuickDraw files are commonly referred to as PICT files.

[ISO 15740:2008, definition 3.35]

3.146
rank ordering method
psychophysical method involving the arrangement by an observer of a series of stimuli in order of increasing or decreasing image quality or an attribute thereof, in accordance with the set of instructions provided

[ISO 20462-1:2005, definition 3.16]

3.147
raw DSC image data
image data produced by, or internal to, a DSC that has not been processed, except for A/D conversion and the following optional steps: linearization, dark current/frame subtraction, shading and sensitivity (flat field) correction, flare removal, white balancing (e.g. so the adopted white produces equal RGB values or no chrominance), missing colour pixel reconstruction (without colour transformations)

[ISO 17321-1:2006, definition 3.4]

3.148
recommended exposure index
REI
specific exposure index value recommended by a DSC provider as a reference for adjusting photographic accessories, as defined in ISO 12232

NOTE REI provides a practical exposure index value for setting the reference exposure index of light meters, studio lighting, etc., but images taken using this exposure index value do not necessarily provide the best image quality.

[ISO 12232:2006, definition 3.8]

3.149
reference stimulus
image provided to the observer for the purpose of anchoring or calibrating the perceptual assessments of test stimuli in such a manner that the given ratings may be converted to JND units

NOTE 1 The plural for this term is reference stimuli.

NOTE 2 This term is also defined in ISO 20462-3.

[ISO 20462-1:2005, definition 3.17]

3.150
removable memory
storage in a user-removable form factor, which is transportable and intended for the digital storage of image data in electronic still cameras

NOTE The memory media can be read/write, write once, etc., but has to be non-volatile when removed from the camera so as to retain the data.

[ISO 12234-1:2007, definition 3.7]

3.151
resolution
measure of the ability of a camera system, or a component of a camera system, to depict picture detail

NOTE 1 Resolution measurement metrics include resolving power, limiting resolution, special frequency response (SFR), MTF and OTF.

NOTE 2 This term is also defined in ISO 16067-1, ISO 16067-2 and ISO 21550.

[ISO 12233:2000, definition 3.25]

3.152
responder
device that responds to operations from the initiator

NOTE The responder is analogous to a server in the client/server paradigm.

[ISO 15740:2008, definition 3.36]

3.153
sample spacing
physical distance between sampling points or sampling lines

NOTE 1 Measured in units of distance (e.g. microns, mm).

NOTE 2 The sample spacing can be different in the two orthogonal sampling directions.

NOTE 3 This term is also defined in ISO 12233, ISO 16067-1, ISO 16067-2 and ISO 21550.

3.154
sampled imaging system
imaging system or device which generates an image signal by sampling an image at an array of discrete points, or along a set of discrete lines, rather than a continuum of points

NOTE The sampling at each point is done using a finite-size sampling aperture or area.

[ISO 12233:2000, definition 3.27, ISO 16067-1:2003, definition 3.11, ISO 16067-2:2004, definition 3.11, ISO 21550:2004, definition 3.16]

3.155
sampling aspect ratio
ratio of the sample spacing in the two orthogonal sampling directions

NOTE If the sample spacing is equal, the aspect ratio of the sampling grid is 1:1, or “square,” so that the sampling aspect ratio provides “square pixels”.

[ISO 12233:2000, definition 3.26]

3.156
sampling frequency
reciprocal of the sample spacing

NOTE 1 Expressed in samples per unit distance (e.g. dots per inch).

NOTE 2 This term is also defined in ISO 16067-1, ISO 16067-2 and ISO 21550.

3.157
scanner
electronic device that converts a fixed image, such as a film or film transparency, into an electronic signal

[ISO 16067-1:2003, definition 3.14, ISO 16067-2:2004, definition 3.14, ISO 21550:2004, definition 3.19]

3.158
scanner opto-electronic conversion function
scanner OECF
relationship between the input density and the digital output levels for an opto-electronic digital image capture system

NOTE This term is also defined in ISO 16067-1, ISO 16067-2 and ISO 21550.

3.159
scene (1)
spectral radiances of a view of the natural world as measured from a specified vantage point in space and at a specified time

NOTE A scene may correspond to an actual view of the natural world or to a computer-generated virtual scene simulating such a view.

[ISO 22028-1:2004, definition 3.35, ISO/TS 22028-3:2006, definition 3.19]

3.160
scene (2)
content or subject matter of an image, or a starting image from which multiple stimuli may be produced through different experimental treatments

NOTE 1 Typically, stimuli depicting the same scene are compared in a psychophysical experiment, because it is the effect of the treatment that is of interest, and differences in image content could cause spurious effects. In cases where scene content is not matched, using a number of scenes will increase the probability that scene effects will average out.

NOTE 2 This term is also defined in ISO 20462-1 and ISO 20462-3.

3.161
scene luminance ratio
ratio of the highest (highlight) luminance value to the lowest (shadow) luminance value in a scene

NOTE See also **scene (1)** (3.159).

[ISO 14524:2009, definition 3.14]

3.162
scene-referred image state
image state associated with image data that represents estimates of the colour-space coordinates of the elements of a scene

NOTE 1 When the phrase “scene-referred” is used as a qualifier to an object, it implies that the object is in a scene-referred image state. For example, scene-referred image data are image data in a scene-referred image state.

NOTE 2 Scene-referred image data can be determined from raw DSC image data before colour-rendering is performed. Generally, DSCs do not write scene-referred image data in image files, but some do so in a special mode intended for this purpose. Typically, DSCs write standard output-referred image data where colour-rendering has already been performed.

NOTE 3 Scene-referred image data typically represents relative scene colorimetry estimates. Absolute scene colorimetry estimates may be calculated using a scaling factor. The scaling factor can be derived from additional information such as the image OECF, FNumber or ApertureValue, and ExposureTime or ShutterSpeedValue tags.

NOTE 4 Scene-referred image data can contain inaccuracies due to the dynamic range limitations of the capture device, noise from various sources, quantization, optical blurring and flare that are not corrected for, and colour analysis errors due to capture device metamerism. In some cases, these sources of inaccuracy can be significant.

NOTE 5 The transformation from raw DSC image data to scene-referred image data depends on the relative adopted whites selected for the scene and the colour space used to encode the image data. If the chosen scene adopted white is inappropriate, additional errors will be introduced into the scene-referred image data. These errors can be correctable if the transformation used to produce the scene-referred image data are known, and the colour encoding used for the incorrect scene-referred image data has adequate precision and dynamic range.

NOTE 6 The scene can correspond to an actual view of the natural world, or may be a computer-generated virtual scene simulating such a view. It can also correspond to a modified scene determined by applying modifications to an original scene to produce some different desired scene. Any such scene modifications need to leave the image in a scene-referred image state, and need to be done in the context of an expected colour-rendering transform.

NOTE 7 See also **scene(1)** (3.159).

NOTE 8 This term is also defined in ISO 22028-1.

[ISO/TS 22028-3:2006, definition 3.20]

3.163
session
logical connection between two devices defining a period of time during which obtained state information, such as handle persistence, may be relied upon

[ISO 15740:2008, definition 3.37]