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Photography — Electronic still picture imaging — Vocabulary

Photographie — Prises de vue électroniques — Vocabulaire

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 second edition cancels and replaces the first edition (ISO 12231:1997), which has been technically revised.

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Introduction

Electronic still picture imaging concepts are drawn from traditional photography, electronics, video, and information technology. In some cases the concepts must be 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.

The purpose of this vocabulary is to standardize 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 of most of the terms in this International Standard are the documents on electronic still picture imaging developed by ISO/TC 42/WG 18, and ISO/TC 42/JWG 20 and 23 (with ISO/TC 130). Definitions from some other TC 42 International Standards, e.g. flare, are also included for completeness. The ISO numbers provided in brackets following the definition reference documents listed in the bibliography that serve as the source of the definition. At the end of some definitions, other terms are listed (preceded by "cf.") that are related to the term being defined. An alphabetical index is included at the end of the document.

Terms from working drafts and committee drafts of standards under development within ISO/TC 42 (as of 15 August 2002) are provided in Annex A. These terms are more likely to change as the source documents progress. Definitions are provided in this International Standard to facilitate communication. Where possible, the latest draft of the source document should be reviewed to see if a more current definition is available. Future revisions of this International Standard will include updated terms and definitions consistent with the source documents at the time the revision is prepared.

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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 included. These terms are relevant to the current tasks or are of general interest in electronic still picture imaging.

2 Terms and definitions

2.1
addressable photoelements
number of active photoelements on an image sensor, which is equal to the number of active lines of photoelements times the number of active photoelements per line

[ISO 12233, ISO 16067-1, ISO 16067-2, ISO 21550]

NOTE   The term resolution should not be used when referring to the addressable photoelements. It is possible that the 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.

2.2
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

[ISO 12233, ISO 16067-1, ISO 16067-2, ISO 21550]

NOTE   These artefacts usually manifest themselves as moiré patterns in repetitive image features or as jagged stair-stepping at edge transitions.

2.3
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

[ISO 12233]

2.4
analog-to-digital converter
A/D or **ADC**
circuit that converts an analog signal, having a continuously varying amplitude, to a digitally quantized representation using binary output signals

2.5
application
image application software for use on a personal computer

[ISO 12234-3]

2.6   Aspect ratio

2.6.1
image aspect ratio
ratio of the image width to the image height

[ISO 12233, ISO 15740]

2.6.2
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   Retained from ISO 12231:1997.

2.7
charge coupled device
CCD
type of silicon integrated circuit used to convert light into an electronic signal

2.8
colour filter array
CFA
mosaic or stripe layer of coloured transmissive filters fabricated on top of an imager in order to obtain a colour image from a single image sensor

2.9
colour matching functions
tristimulus values of monochromatic stimuli of equal radiant power

[CIE Publication 17.4 (845-03-23), ISO 17321-1, ISO 17321-2, ISO 22028-1]

cf. **tristimulus value**

2.10
colour space
geometric representation of colours in space, usually of three dimensions

[CIE Publication 17.4 (845-03-25), ISO 17321-1, ISO 17321-2, ISO 22028-1]

2.11 Compression

2.11.1
image compression
process that alters the way digital image data are encoded in order to reduce the size of an image file

[ISO 12233]

2.11.2
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

[ISO 12234-1]

cf. **sound recording**

2.12
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

[ISO 12233]

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 non-linear behaviour, which may result in the nature of the target affecting the measured resolution characteristics. Distance units other than millimetres may also be used.

2.13
DCF
design rule for camera file system
design rules for camera file system as specified in ISO 12234-3

NOTE   DCF provides a standard convention for camera file systems that specifies the file format, folders, and naming conventions in order to promote file interoperability between conforming digital still photography devices.

2.14
DCF basic file
image file stored directly under a DCF directory, having a DCF filename and the extension "JPG" and having the DCF-defined data structure, based on the Exif standard

[ISO 12234-3]

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2.15
DCF basic main image
Exif primary image included in a DCF basic file

[ISO 12234-3]

2.16
DCF basic thumbnail
Exif thumbnail image included in a DCF basic file

[ISO 12234-3]

2.17
DCF-compatible
meeting the requirements of ISO 12234-3

[ISO 12234-3]

2.18
DCF directory
directory under the DCF image root directory for storing images, created in accordance with the DCF directory rules

[ISO 12234-3]

2.19
DCF directory name
directory name assigned in accordance with the DCF directory-naming conventions

[ISO 12234-3]

2.20
DCF extended image file
image file stored directly under a DCF directory, having an extension and data structure different from a DCF basic file

[ISO 12234-3]

2.21
DCF file name
file name assigned in accordance with the DCF file-naming conventions

[ISO 12234-3]

2.22
DCF image root directory
directory directly under the root directory, created in accordance with the DCF directory rules

[ISO 12234-3]

2.23
DCF media
removable memory recorded in accordance with the DCF requirements

[ISO 12234-3]

2.24
DCF object
group of files having the same file number stored in the same DCF directory

[ISO 12234-3]

2.25
DCF thumbnail file
compressed file for storing the thumbnail image of a DCF extended image file

[ISO 12234-3]

2.26
depth of field
difference between the maximum and minimum distances from a camera lens's front nodal point to objects in a scene that can be captured in acceptably sharp focus

2.27
digital output level
digital code value
numerical value assigned to a particular output level

[ISO 14524, ISO 15739, ISO 16067-1, ISO 16067-2, ISO 21550]

2.28
digital still camera
DSC
device which incorporates an image sensor and produces a digital signal representing a still picture

[ISO 12234-3, ISO 17321-1, ISO 17321-2]

NOTE   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.

2.29
directory number
three-digit number which is comprised of the first three characters of the DCF directory name

[ISO 12234-3]

2.30
edge spread function
ESF
normalized spatial signal distribution in the linearized output of an imaging system resulting from imaging a theoretical infinitely sharp edge

[ISO 12233, ISO 16067-1, ISO 16067-2, ISO 21550]

cf. **line spread function, point spread function**

2.31
effectively spectrally neutral
having spectral characteristics which result in a specific imaging system producing the same output as for a spectrally neutral object

[ISO 12233, ISO 16067-1, ISO 16067-2, ISO 21550]

cf. **spectrally neutral**

2.32
electronic scanner(1)
⟨photographic films⟩ scanner incorporating an image sensor that outputs a digital signal representing a still film image

[ISO 16067-2, ISO 21550]

2.33
electronic scanner(2)
⟨photographic prints⟩ scanner incorporating an image sensor that outputs a digital signal representing a still print image

[ISO 16067-1]

2.34
electronic shutter
any one of three devices for controlling the exposure time of an electronic still picture camera

2.34.1
electronically shuttered sensor
component of an electronic still camera which electronically controls the image sensor itself in order to set the exposure time

2.34.2
electromechanical shutter
mechanical shutter which is electronically controlled

2.34.3
electro-optical shutter
electronically driven device in front of the image sensor which changes the optical path transmittance

2.35
electronic still picture camera
camera incorporating an image sensor that outputs an analog or digital signal representing a still picture, and/or records an analog or digital signal representing a still picture on a removable medium, such as a memory card or magnetic disc

[ISO 12232, ISO 12233, ISO 15739]

2.36
Exif
exchangeable image file format
digital still camera image file format standard of the Japan Electronic Industry Development Association (JEIDA)

[ISO 12234-3]

NOTE   The JPEG version of Exif provides a compressed file format for digital cameras in which the images are compressed using the baseline JPEG standard described in ISO/IEC 10918-1, and metadata and thumbnail images are stored using TIFF tags within an application segment at the beginning of the file.

2.37
exposure index
numerical value that is inversely proportional to the exposure provided to an image sensor to obtain an image

[ISO 12232]

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

2.38
exposure process
various methods to capture images in the electronic still picture camera

2.38.1
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

2.38.2
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.

2.38.3
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.

2.39
exposure series
series of images of the same subject taken using different exposure index values

[ISO 12232]

2.40
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, ISO 16067-2, ISO 21550]

2.41
file extension
three identifying characters used in the DOS/FAT file system following the file name and dot

[ISO 12234-3]

2.42
file name
eight-character file name of the DOS/FAT file system, excluding the dot and file extension

[ISO 12234-3]

2.43
file number
four-digit number which comprises the last four characters of the DCF file name

[ISO 12234-3]

2.44
file system
software structure which specifies how the data are logically organized on a given storage medium

[ISO 12234-1, ISO 12234-2]

2.45
flare
light falling on an image, in an imaging system, which does not emanate from the subject point

[ISO 3664]

cf. **veiling glare**

NOTE   Veiling glare is also sometimes referred to as flare.

2.45.1
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

[ISO 3664]

NOTE 1   The veiling flare radiation may be from inside or outside the field of view of the system.

NOTE 2   Light leaks in an optical system housing can cause additional unwanted irradiation of the image plane. This irradiation may resemble veiling flare.

2.46
free characters
five characters following the directory number in a DCF directory name, or the four characters at the beginning of a DCF file name

[ISO 12234-3]

2.47
gamma correction

signal processing operation that changes the relative signal levels in order to adjust the image tone reproduction

[ISO 12232, ISO 16067-1, ISO 16067-2, ISO 21550]

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.

2.48
hardcopy

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

[ISO 3664, ISO 17321-2, ISO 22028-1]

2.49
horizontal pixels

number of luminance pixels of image data in the main (x-axis) scanning direction

[ISO 12234-3]

2.50
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]

2.51
illuminance scale exposure series

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

[ISO 14524]

cf. **time scale exposure series**

2.52
image data format

structure and content which specifies how the data is logically organized on a given storage medium

[ISO 12234-1, ISO 12234-2]

2.53
image sensor

electronic device that converts incident electromagnetic radiation into an electronic signal

[ISO 12232, ISO 12233, ISO 15739, ISO 16067-1, ISO 16067-2, ISO 21550]

EXAMPLE   A charge coupled device (CCD) array.

2.54
image storage application profile
ISAP
media profile plus the image data format

[ISO 12234-1]

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

2.55
imager size
⟨area array sensor⟩ physical dimensions, in height and width, of the photoresponsive area of an imaging sensor

NOTE   The following addition is adapted from EIAJ EDX-5301: The measure of imager size for a video-based still picture camera is described by the approximate diameter of a tube-type image sensor which is equivalent to a diagonal length of the solid-state image sensor. The expressions of diameters of 2/3, 1/2, 1/3 or 1/4 inch (type) correspond to actual imager sizes of 6,6 mm × 8,8 mm, 4,8 mm × 6,4 mm, 3,6 mm × 4,8 mm, and 2,7 mm × 3,6 mm respectively, for 4:3 image aspect ratio sensors.

2.56
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

[ISO 14524, ISO 15739, ISO 21550]

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.

2.57
incremental output signal
input level (luminance or exposure, not logged) multiplied by the system incremental gain at that level

[ISO 14524, ISO 15739, ISO 21550]

cf. **incremental gain function**

2.58
incremental signal-to-noise ratio
ratio of the incremental output signal to the root mean square (rms) noise level, at a particular signal level

[ISO 15739, ISO 21550]

NOTE   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.

2.59
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]