



Guideline of the Camera & Imaging Products Association

CIPA DCG-001-Translation-2018

Individual Guidelines for noting digital camera specifications on Number of pixels, Image file and Focal length of the lens

This translation is based on the original Guideline (CIPA DCG-001-2018). In the event of any doubts arising as to the contents, the original Guideline in Japanese shall prevail.

Established in January, 2018

Prepared by
Standardization Committee

Published by
Camera & Imaging Products Association

THIS DOCUMENT IS PROVIDED “AS IS” BASIS WITHOUT WARRANTY OF ANY KIND, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT.

IN NO EVENT SHALL EITHER CIPA, CIPA’S MEMBERS, THEIR SUBSIDIARIES OR AFFILIATES BE LIABLE FOR ANY DAMAGES WHATSOEVER (INCLUDING WITHOUT LIMITATION, LOSS OF BUSINESS PROFITS, LOSS OF BUSINESS INFORMATION, LOSS OF BUSINESS INTERRUPTION OR OTHER COMPENSATORY, INCIDENTAL OR CONSEQUENTIAL DAMAGES) ARISING OUT OF THIS DOCUMENT OR USE THEREOF EVEN IF CIPA, CIPA’S MEMBERS, THEIR SUBSIDIARIES OR AFFILIATES HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

CIPA, CIPA’S MEMBERS, THEIR SUBSIDIARIES OR AFFILIATES DISCLAIMS AND SHALL HAVE NO OBLIGATION OF DEFENSE, CONTRIBUTION OR INDEMNITY WITH RESPECT TO ANY ACTUAL OR ALLEGED INTELLECTUAL PROPERTY INFRINGEMENT ARISING OUT OF THIS DOCUMENT OR USE THEREOF.

THIS DOCUMENT CONTAINS INFORMATION THAT IS CONFIDENTIAL.

Contents

1. Foreword	--- p 1
2. Purpose of publication	--- p 1
3. Rules for implementation	--- p 1
4. Scope	--- p 2
5. Items to be noted in catalogues	--- p 2
(1) Number of pixels related items	--- p 2
(1-a) Number of effective pixels	--- p 5
(1-b) Number of total pixels	--- p 6
(1-c) Number of recorded pixels	--- p 7
(1-d) Number of output pixels	--- p 8
(2) Image file related items	--- p 9
(2-a) Image file size	--- p 9
(2-b) Recorded image file format	--- p10
(2-c) Image data compression ratio	--- p11
(2) Focal length of the lens related items	--- p12
(3-a) Focal length of the lens	--- p12
(3-b) 35mm film equivalent lens focal length	--- p13
(Annex 1) Relationship between each pixel-related definition	--- p 14
(Annex 2) Examples of descriptions in catalogues	--- p 15
(Annex 3) Informative figures relating geometric distortion image compensation	--- p 16
Reference standards	--- p 17
Commentary	--- p 18
Revision history	--- p 19
Deliberation committee members	--- p 21

Individual Guidelines for noting digital camera specifications on Number of pixels, Image file and Focal length of the lens

1. Foreword

This guideline was first published by JCIA (Japan Camera Industries Association) who was the predecessor of CIPA (the Camera & Imaging Products Association) in 1998 when the dawn of the digital camera age, and has been revised several times since that time to the present. Reflecting the situation when the first edition published, it combined several guidelines for noting specifications which were urgently needed and created at the time. Consequently it is formed by plural items, but does not cyclopaedically contain many specifications on digital camera. In other words, it is placed as individual guidelines for respective specifications. There is another document CIPA DCG-002 (the first edition was published in 2007) which is a cyclopaedic guideline on specifications of a digital camera. If there are any differences between these two documents on the items described in this guideline DCG-001, this guideline that is individual guidelines is given priority.

In addition, this guideline has some different appearances from other CIPA standards because the editing at the revisions has been limited to only the minimum technical corrections, for valuing the continuity with the previous editions. However, exceptionally, the title of the guideline, which had been an irregular one until 2014 edition keeping former title including JCIA document number, has been revised into the new title showing the contents more directly at this time, because there were some problems such that the irregular title caused misunderstandings.

2. Purpose of publication

The purpose of this guideline is to provide uniform information about DSCs from DSC suppliers. Standardization of the rules for representing specifications noted in catalogues or other printed matter will provide accurate knowledge of the products to customers, and help them when they choose, purchase, or use DSCs.

3. Rules for implementation

To achieve the purpose above each DSC supplier shall observe the following rules with sincere effort.

- a) When an item that is described in this guideline is noted in any matter which can be noticed by customers, such as catalogues, printed matter which provides specifications of the product, or software, the item shall comply with this guideline.
- b) In case of revision, the revised portions of this guideline shall apply to products that are released to the market after the publication date of the revised edition. Even though transitional applications are permitted if there is a reasonable cause, complete adherence to this guideline is required for all new products which are launched 6 months after publication (in case of no same date, 1st of the next month).
- c) Even though all responsibility, relative to the items mentioned here being used in printed matter or on software, is left to the describer's discretion based on the policy of the describer's organization, any description which differs from the actual specification, causes customer misunderstanding concerning the excellence of the product, or impedes fair competition by unfairly enticing customers, shall be prohibited.

4. Scope

This guideline shall apply to digital cameras (official name: digital still camera) as defined below. It may also apply to products that resemble digital cameras.

<Definition of digital camera>

A camera which includes a lens and an image sensor, and which records captured still image data into internal or removable digital recording media as its primary function.

This guideline is primarily intended for the noting of specifications in catalogues, other printed matter that describes product specifications, or on software products. However, obviously, the objectives of this guideline shall also be observed for noting on the product, representations in advertising or on point-of-purchase promotional materials etc., which are directly related

5. Items to be noted in catalogues

The rules of description in catalogues are described below.

(1) Number of pixels related items

In previous guidelines, we had requested that suppliers diligently note the specifications of image sensors in printed matter and software related materials for digital cameras. However, with technological improvements and diversification of digital cameras, we are in the situation that it does not match the current status enough. Therefore, to help the general consumer to quickly and properly understand the products, suppliers shall note heeding the following instructions.

- i) The number of effective pixels shall be written first when describing image capturing performance.
- ii) Therefore, when noting other pixel numbers, such as the number of total pixels or number of recorded pixels, the supplier shall ensure that they are not confused for the number of effective pixels.
- iii) When noting other pixel number along with the number of effective pixels, the number of effective pixels shall be noted as primary notation.
- iv) When both the number of effective pixels of a camera and the size of an image sensor are noted, the number of total pixels of the image sensor shall also be noted near the number of effective pixels.

(1-a) “Number of effective pixels”

Definition

The number of pixels on the image sensor which receive input light through the optical lens, and which are effectively reflected in the final output data of the still image. The number of ring pixels may be included. (Specification of the camera.)

Ring pixel: The reasonable and minimum pixels surrounding the image area required for the filtering process.

Image area: The area where the area of a still image that is output from the camera is transposed on the image sensor (focal plane).

Rules for notation

- a) The number of effective pixels defined in this guideline shall be used whenever the performance of cameras is noted. The number of effective pixels of the image sensor itself thus shall not be used, because the latter has a different definition from the one defined here.
- b) For cameras that use a plurality of image sensors, the number of image sensors and the number of effective pixels corresponding to each image sensor shall be noted. However the summation of the number of effective pixels may also be noted. If the summation of the number of spatially sampled pixels (ring pixels may be included) is also noted, the description shall clearly state that the noted number is the summation of effective pixels of all the image sensors, to avoid consumer misunderstanding.
- c) For cameras that move the position of the image sensor (including linear sensors) spatially or optically for image capture, the number of effective pixels and the number of sampling positions shall be noted. If the summation of the number of sampled pixels (ring pixels may be included) is also noted, the description shall clearly state that the noted number is the summation of the number of pixels with enough explanation, to avoid consumer misunderstanding.
- d) If the number of effective pixels varies along with the variation of the focal length of the taking lens, the minimum number of effective pixels within the variation shall be used as primary notation^{*1}. However, only for image processing that compensates geometric distortion (excluding electronic zoom^{*2}), the maximum number of effective pixels within the variation may be noted as primary notation^{*3} for the number of effective pixels.

*1: “Primary notation” means “notation which describes feature name and value solely or most noticeably when noting multiple terms”.

*2: “Excluding electronic zoom” means that the resulting image includes a pixel or more of which the compensating magnification is 1. Compensating magnification is a ratio of the distance from the image centre (i.e. the centre of the compensation) before and after compensation on the imaging surface. For the centre itself, the asymptotic value of the magnification of the neighbour points is adopted. (See annex 3. Note that compensating magnification in this guideline differs from localized magnification.)

*3: When explaining in a note that the number of effective pixels varies along with the variation of the focal length, as explained in the underlined sentence beginning with “However” above, the description shall not cause uncertainty among general users.

- e) Numerical values may be rounded to two digit significant figures.

Examples of notation

a) “2.0M Effective Pixels,” “Number of Effective Pixels 3,150k (or 3.2M)”

b) “Number of Effective Pixels 340k x 3”

“3 x Number of Effective Pixels 340k CCDs”

“Number of Effective Pixels 1,020k (340k x 3)”

“Number of Effective Pixels 1.0M (340k x 3)”

c) In the case of linear sensors:

“Number of Effective Pixels 1,000 pixels x 1,500”

“Number of Effective Pixels 1,000 pixels x 1,500 steps”

In the case of area sensors:

“Number of Effective Pixels 340k x 4”

“Number of Effective Pixels 340k x 4 steps”

d) When the number of effective pixels varies along with the variation of the focal length:

“Number of Effective Pixels 13M”

“Number of Effective Pixels 13M (Maximum 15M)”

And also when geometric distortion is compensated (excluding electronic zoom)

“Number of Effective Pixels 15M”

“Number of Effective Pixels 15M

Note: The number of pixels may decrease due to image processing that corrects image distortion”

“Number of Effective Pixels (Maximum) 15M”

e) When a partial number of pixels are used:

“Number of Effective Pixels 10M,

Number of Total Pixels 15M,

Size of image sensor 1/2.3 type”

f) When a partial number of pixels are used and also the number of effective pixels varies along with the variation of the focal length:

“Number of Effective Pixels 10M (Maximum 12M),

Number of Total Pixels 15M,

Size of image sensor 1/2.3 type”

And also when geometric distortion is compensated (excluding electronic zoom)

“Number of Effective Pixels 12M,

Number of Total Pixels 15M,

Size of image sensor 1/2.3 type”

“Number of Effective Pixels 12M,

Note: The number of pixels may decrease due to image processing that corrects image distortion

Number of Total Pixels 15M,

Size of image sensor 1/2.3 type”

“Number of Effective Pixels (Maximum) 12M,

Number of Total Pixels 15M,

Size of image sensor 1/2.3 type”

Note:

- a) Number of effective pixels that includes ring pixels provides a somewhat larger value than the maximum number of recorded pixels, even for a camera having no pixel interpolation.
- b) The area used for image stabilization when shooting movies shall not be included.
- c) The optical black area shall not be included.

(1-b) “Number of total pixels”

Definition

The total number of pixels possessed by the image sensor (specification of the image sensor).

Rules for notation

- a) “Number of total pixels” shall be used only for explanations of the image sensor. The “number of effective pixels” shall be used when specifications of the camera are noted.
- b) Terms indicating image sensors, such as “image sensor”, “solid-state image sensor” or “CCD”, shall be used.
- c) For cameras that use multiple image sensors, the number of image sensors shall be noted. Reporting only the total number of pixels shall not be allowed.
- d) Numerical values may be rounded to two digit significant figures.

Examples of notation

- a) “2 M Effective Pixels (using CCD with 2.1 M Number of Total Pixels)”
- b) “Number of Effective Pixels $340k \times 3$ (using 3 CCDs with 380k Number of Total Pixels each)”

(1-c) “Number of recorded pixels”

Definition

The number of pixels comprising one picture frame which is recorded to digital recording media.

Rules for notation

- a) The “number of recorded pixels” or other wording which has the same meaning shall be used. The term “resolution” shall not be used for the number of recorded pixels.
- b) The number of horizontal and vertical pixels of the luminance signal that are recorded to digital recording media shall be reported. The horizontal dimension should be written before the vertical dimension, unless there is no distinction between them.
- c) The components of the image signal should also be noted. To describe the components of the image signal, the chrominance signal may be noted with symbols “RGB”, “YCbCr”, etc., or terms such “Y/C”, “line sequential system”, or “color difference system” may be used. When there is no chrominance signal, a description without color signals such as “monochrome signal” is to be used.
- d) Further description of the composition ratio of the chrominance signal, such as “4:4:4” or “4:2:2”, is recommended.
- e) When the number of pixels is increased by means of image processing, such as interpolation, the pixels are considered recorded pixels if the pixels are recorded.
- f) Numerical values may be rounded to two digit significant figures.

Examples of notation

- a) “Number of Recorded Pixels 640×480 (RGB 4:4:4)”
- b) “Number of Recorded Pixels $1,280 \times 960$ (1.2M)”
- c) “Image Signal Components: YCbCr 4:2:2”

(1-d) “Number of output pixels”

Definition

The number of pixels comprising one picture frame which is output from the camera by transmission means.

Rules for notation

- a) Wording which indicates the number of pixels output from the camera by the transmission means, such as the “number of output pixels”, the “number of pixels communicated”, or the “number of transmitted pixels” shall be used.
- b) The number of horizontal and vertical pixels of the luminance signal output from the camera shall be reported. The horizontal dimension should be written before the vertical dimension, unless there is no distinction between them.
- c) Description of the components of the image signal is recommended, but when the components are described as part of the previously mentioned “number of recorded pixels”, this additional reference may be omitted.
- d) Further description of the composition ratio of the chrominance signal, such as “4:4:4” or “4:2:2”, is recommended, but when the composition ratio of the chrominance signal is described as part of the previously mentioned “number of recorded pixels”, this reference may be omitted.
- e) An increase in the number of pixels by means of image processing, such as interpolation, is considered output if the pixels are output. When the number of pixels has been decreased such as by data compression, the act of compression shall be indicated.
- f) Numerical values may be rounded to two digit significant figures.

Examples of notation

- a) “Number of Output Pixels 640×480 (RGB 4:4:4)”
- b) “Number of Transmitted Pixels $1,280 \times 960$ (1.2M)”

Note: “Number of output pixels” shall be distinguished from “number of recorded pixels”.

(2) Image file related items

(2-a) “Image file size”

Definition

The amount of information comprising one image frame which is recorded to the digital storage media.

Rules for notation

- a) “Image file size” or similar wording which has the same meaning shall be used.
- b) Total data amount of one image frame, including image data and appended data, such as a file header, shall be noted in bytes (symbol: B).
- c) Terms such as “file” or “frame”, which indicate “per image frame”, shall be used.
- d) When the file size varies by image, an explanation shall be provided. In this case, it is still recommended to indicate the approximate file size.
- e) Numerical values may be rounded to two digit significant figures.

Examples of notation

- a) “Image File Size: 40 kB/frame”
- b) “Image File Size Approx. 30-60 kB (variable file sizes)”

(2-b) “Recorded image file format”

Definition

The image file format and directory structure that are recorded to digital storage media.

Rules for Notation

- a) “Recorded image file format” or similar wording which has the same meaning shall be used.
- b) When a standard format such as DCF is used, it is recommended that the name of the format along with its version number be provided. An original file format shall be described as being “original”.
- c) When a type of file format is used to output from the camera, a term such as “output image file format” shall be used to distinguish from the recorded image format.

Examples of notation

- a) “Recorded Image File Format: Conforms to DCF (Design rule for Camera File System) 1.0”
- b) “Recorded Image File Format (Non-compressed): TIFF”
- c) “Recorded Image Format: Conforms to JPEG (Exif Ver. 2.1)

(2-c) “Image data compression ratio”

Definition

The compression ratio when image data is compressed with image processing circuitry.

Rules for notation

- a) “Image data compression ratio” or similar wording shall be used.
- b) The value shall indicate the ratio of the size of the compressed image data compared to the size of the image data that was input to the compression processing circuitry.
- c) It is recommended that the components of the input image signal, such as RGB or YC, be noted.
- d) It is recommended to express the value as a fraction with a numerator of 1. In this case, a denominator may be rounded off to the nearest whole number.
- e) In cases where a variable image compression method is used, and the compression ratio varies due to the subject in the scene, an explanation shall be added indicating that the camera uses a variable compression ratio.

Examples of notation

- a) “Image Data Compression Ratio: 1/10”
- b) “Image Data Compression Ratio: Standard 1/15 (varies according to the object)”

Notes

- a) A proposal to use RGB 4:4:4 (three units of data for each pixel) as the denominator for the compression ratio was discussed. However, to avoid the difficulties associated with the compression ratio not being 1 even though compression was not conducted, it was decided to adopt the data to be actually compressed as reference.
- b) To avoid confusing consumers with the problem of the denominator mentioned in note a), it was decided that either the components of the compressed input image or the “image file size” shall be reported.
- c) Since the term “bit/pel” is not easily understood by consumers, it was decided not to adopt it in this guideline.

(3) Focal length of the lens related items

(3-a) “Focal length of the lens”

Definition

The distance along the optical axis between the secondary (back) principal point and the focal point when being focused on a subject at infinity. (The precise definition using figures and equations shall comply with ISO 517)

Rules for notation

- a) The indicated value shall be such that this value of an actual product is within $\pm 5\%$ of the indicated value.
- b) The value shall be described in unit of mm.
- c) For cameras with zoom function, regardless of the factory shipping values, the values available by zooming may be indicated.

Example of notation

- a) “Lens Focal Length: 3.5 mm”
- b) “Zoom lens (Focal Length: 3.5 to 10.5 mm)”

(3-b) “35mm film equivalent lens focal length”

Definition

The value such that the focal length of the lens is converted into the focal length of a 35mm film camera lens. It shall be calculated by the following equation. (Supplemental explanation is described in the commentary at the end of the book.)

35mm film equivalent lens focal length =

$$\text{Focal length of the lens} \quad x \quad \frac{\text{Diagonal length of 35mm film picture size}^{*1} (43.27 \text{ mm})}{\text{Diagonal length}^{*3} \text{ of picture size}^{*2} \text{ on the image sensor}}$$

*1: 35mm film picture size complies with the picture size of ISO 1754.

*2: picture size on the image sensor shall comply with the image area where the lens with no geometric distortion is assumed (in other words, when image processing for geometric distortion compensation is not used). See (1-a), appendix 1 and 3 for information of image area, especially appendix 3 for its relation to picture size.

*3: numerical value with three or more significant digits shall be used to calculate.

Rules for notation

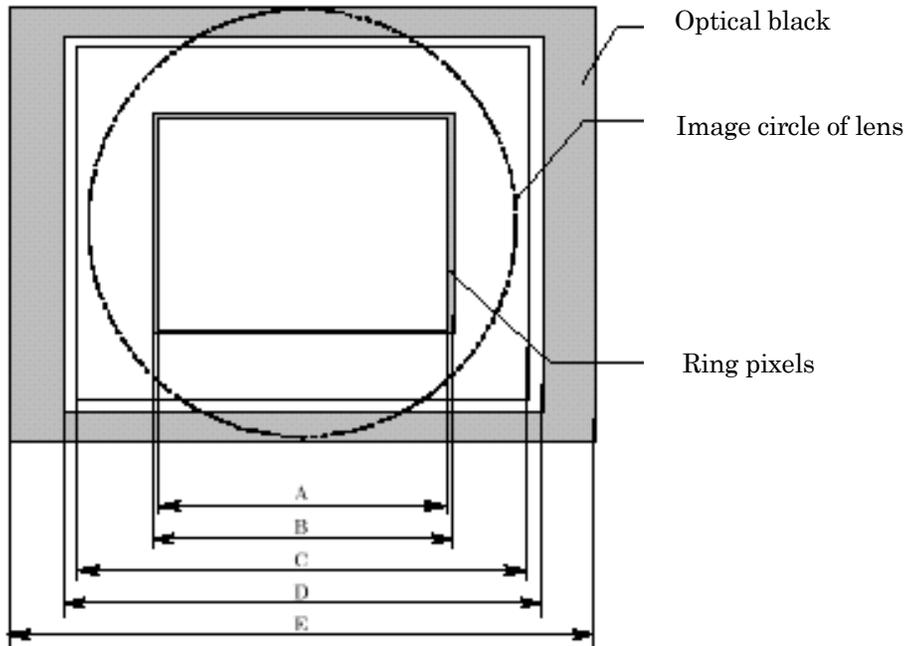
- a) “35mm film equivalent” or similar wording shall be used.
- b) The indicated value shall be described in unit of mm. The numerical value may be rounded off (up on five and down on four) to the nearest whole number, or may be rounded within $\pm 2\%$. Regardless of the above, only in the case at the T (tele) end of a zoom lens and also if the indicated value at the W(wide) end is already decided, the value calculated by the decided W value and the indicated optical zoom ratio may be used as the indicated value at the T end.
- c) For cameras with zoom function, regardless of the factory shipping values, the values available by zooming may be indicated.
- d) It is recommended for an interchangeable lens to add the noting of the precondition: for example the value of picture size on the image sensor or the product name of the camera body used to calculate.

Example of notation

- a) “Lens Focal Length: 7 mm (Corresponds to 50 mm in 35mm film equivalent)”
- b) “Lens Focal Length: Corresponds to 24-100 mm (35mm film equivalent)”

(Annex 1) Relationship between each pixel-related definition

The following figure shows the relationship between each pixel-related definition.



- A: Effective pixels (image area without ring pixels)
- B: Effective pixels (with ring pixels)
- C: Maximum available pixels (pixels guaranteed by the vendor of image sensor)
- D: Effective pixels of image sensor
- E: Total pixels

Figure 1. Schematic diagram of image sensor

The relationship between Number of Effective Pixels A (without ring pixels) and the Number of Recorded Pixels and the Number of Output Pixels is as follows.

$A =$ Number of Recorded Pixels or Number of Output Pixels (without interpolation or sub-sampling)

$A <$ Number of Recorded Pixels or Number of Output Pixels (with interpolation)

$A >$ Number of Recorded Pixels or Number of Output Pixels (with sub-sampling)

(Annex 2) Examples of descriptions in catalogues

The following tables show examples of a specifications column.

Table 1. Example one of specifications column in catalogue

Camera Part	Number of Effective Pixels	1.97M
	Focal Length of Lens	7 mm (corresponds to 34 mm in 35mm film)
Image sensor	System	Interlaced CCD
	Size	1/1.8 type
	Number of Total Pixels	2.11M
Recording Part	Number of Recorded Pixels	1,600 × 1,200 (1.9M) 1,280 × 960 (1.2M)
	Recorded Image File Format	Conforms to DCF (Design rule for Camera File system) 1.0
	Image File Size	700 kB/Frame (fine mode)
	Image Data Compression Ratio	Approx. 1/10

Table 2. Example two of specifications column in catalogue

Number of Effective Pixels	2.0M
Image Sensor	1/1.8-type CCD (total number of pixels: 2,1M)
Focal Length of Lens	7 mm (corresponds to 34 mm in 35mm film)
Number of Recorded Pixels	1,600 × 1,200 (1.9M pixels) 1,280 × 960 (1.2M pixels)
Recorded Image File Format	Conforms to DCF (Design rule for Camera File System) 1.0
Image File Size	700 kB/Frame (fine mode)
Image Data Compression Ratio	Approx. 1/10

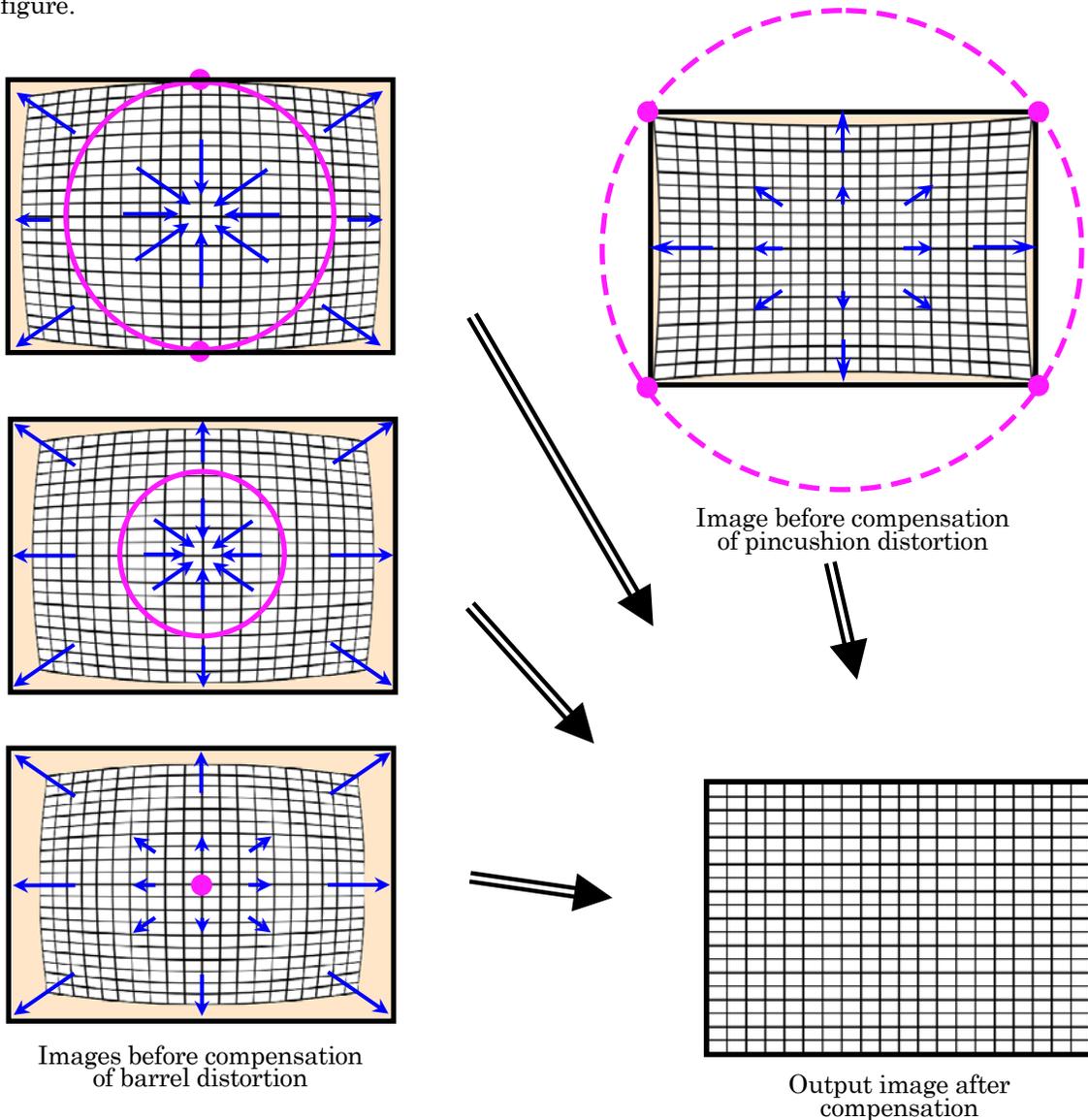
(Annex 3) Informative figures relating geometric distortion image compensation

Example figures with pixels that have a compensating magnification of 1 in (1-a) “Number of effective pixels” Rules for notation d) *2.

- indicates the location of pixels with compensating magnification of 1.
- indicates that they are located at the contact point or the centre of the picture frame

* For the images before compensation in the figure, the area that is included in the final output image (the part corresponding to the image area) is indicated with grid lines. Arrows schematically indicate rough shifting directions of the pixels when distortion compensation is performed; they do not express a specific positional relationship of movement or amount of movement.

“Picture size on the image sensor” in (3-b) “35mm film equivalent lens focal length” is “where the lens with no geometric distortion is assumed (in other words, when image processing for distortion compensation is not used)”, therefore it corresponds to the common outer rectangular in every figure.



Reference standards

The standards or guidelines referred to in this guideline are follows.

For standards issued by CIPA, the latest edition of the referenced document (including any amendments) applies.

For other standards, only the edition cited applies for dated standards, and the latest edition of the referenced document (including any amendments) applies for undated standards.

- 1) CIPA DCG-002-Translation-2016 Specification Guideline for Digital Cameras (Revised version)
- 2) ISO 517:2008 Photography — Apertures and related properties pertaining to photographic lenses — Designations and measurements
- 3) ISO 1754:2010 Photography — Cameras using 35 mm film and roll film — Dimensions of picture sizes

Commentary

Supplemental explanation for 5. (3) (3-b)

“35mm film equivalent lens focal length” is obtained by proportional calculation using the ratio of the Diagonal lengths between the picture size of 35mm film cameras and the picture size of a digital camera.

It is common usage from the age of film camera to present golden age of digital camera to use the taking lenses with different focal lengths depending on the situation utilizing viewing angle and image magnification vary depending on focal length of the lens. And it can be said that viewing angle or image magnification is one of the most significant elements of the feelings of camera operation.

However, digital cameras equip with various (mainly smaller than that of film camera) picture size, therefore there are quite different operating feelings with using the same focal length lens because the viewing angle and the image magnification are different. For resolving this inconvenience, an indicator to use as the guide of operating feeling is “35mm film equivalent lens focal length”

Using this equivalent value brings almost the same operating feelings (almost the same viewing angle or image magnification) as the shooting by 35mm film camera, where the same viewing angle means that the area of the subject captured in the output image is the same, and the same image magnification means that the size of the reproduced image is the same when the output image is reproduced on the screen (print or monitor) of the same size.

However, the followings are noticeable. Regardless of whether film or digital camera, actual taking lens has geometric distortion characteristics, thus the same focal length can be different viewing angle and the image magnifications of the centre and outer positions of the screen can be different. (So usually the centre of the screen is specified as the reference point of image magnification.)

Hence, viewing angle or image magnification is not precisely the same even when equivalent lens focal length is the same.

In spite of the above, viewing from opposite side, if we do not care the difference of view angle or image magnification derived from geometric distortion characteristics (in other words, ignore geometric distortion characteristics), focal length is quite a convenient indicator as a rough guide to show viewing angle or image magnification. Therefore it has been used from the age of film camera, and the situation has never changed for digital camera.

Currently, “35mm film equivalent lens focal length” is widely recognized by consumer and industry people as a guide to show viewing angle also. But, when the digital camera applies distortion compensation processing, it can cause the case that there is great discrepancy between actual viewing angle and the angle supposed from “35mm film equivalent lens focal length”. In this case, it is conceivable that each vender specifies the private indicator as a guide to show angle of view and notes it in addition to the indicator relating focal length. However in this situation, it is important to care so that the private indicator dose not cause confusion or misunderstanding with this indicator “35mm film equivalent lens focal length”.

Revision history

1998-3-12 Established	JCIA DSGSG001-1998	(Renamed to “JCIA GLA01” later)
2001-4-10 Revised	JCIA DSGSG001-2001	(Renamed to “JCIA GLA02” later)
2001-7-17 Revised	JCIA GLA03	Changed notation rules and examples for multi-sensor cameras
2005-10-11 Revised	CIPA guideline DCG-001-2005	Clarified notation rules and added examples, for multi-sensor cameras (summation notation)
2014-2-26 Revised	CIPA guideline DCG-001-2014	In 5., iv) was added to (1); in (1-a), clarified notation rules for the case in which the “number of effective pixels” varies along with variation of lens focal length
2018-1-23 Revised	CIPA guideline DCG-001-2018	Renewed title of the guideline Refined construction (chapter) Added Contents, Reference standards and Commentary Rewritten 1. “forward” totally In 5.(3) +Added (3-a) “Focal length of the lens” as a new item + In (3-b) “35mm film equivalent lens focal length“ -- Modified definition (error correction). -- Modified description on numerical rounding. -- Added application for zoom lens. . In appendix 3 +Redrawn figures totally(clarification) +Added supplemental explanation for 5. (3) (3-b) Modified some descriptions other than the above

Supplemental explanation for Revision history

Revision to the edition 2018 includes format refinement and technical update, the latter is mainly relates focal length of the taking lens. That is (1) guideline for “Focal length of the lens” that were hitherto regarded as obvious issue is added as a new item (2) existent item “35mm film equivalent lens focal length” is reviewed. Especially about (2), even the converting equation is modified: it is for error correction but is not change of contents (intention).

Concretely, the denominator of converting equation is changed to “Diagonal length of picture size on the image sensor” from former “Diagonal length of image area of image sensor”. Details are bellow. As described in *2 of (3-b) “35mm film equivalent lens focal length” Definition, picture size on the image sensor shall comply with the image area when image processing for geometric distortion compensation is not used. So at the present, it seems that it was to be described as the currently revised text at first. However image area is the basis of the picture size on the image sensor, and therefore these two areas were theoretically the same before the advent of distortion compensation technology. Thus prior description was correct at that time and rather tended not to derive misunderstanding since it showed the basis directly.

After that at the previous revision (2005 edition →2014edition), the noting rule when (1-a) “Number of effective pixels” varies with focal length of the lens has been clarified, it was the response for the situation that the image area varying case arose from the advent of distortion compensation technology. Hence it had also to be done the description change introduced to the 2018 revision on the “35mm film equivalent lens focal length”. In other words, at the previous revision, though the effect given on Number of effective pixels by variation of image area was considered, the fact that it also effects on the prior conversion equation for 35mm

film equivalent lens focal length was missed and left as it was. It should deeply be regretted as a participant of the previous revision. But fortunately, it has not arose practical confusion in the market, because every company which has been using this guideline as a rule also could not notice this effect and then each actual use has been as if reflected 2018 revision in advance as a result.

Besides that, also rounding rule of numerical value are reviewed and modified on (2).

6. Deliberation committee members (Revised version 2018)

Standardization Committee

Chair	Canon Inc.	Masao Suzuki
Vice Chair	Olympus Corporation	Hideaki Yoshida
Vice Chair	Sony Imaging Products & Solutions Inc.	Naoya Katoh
Vice Chair	NIKON CORPORATION	Kazuharu Imafuji
Vice Chair	Panasonic Corporation	Masaaki Nakayama
Vice Chair	FUJIFILM Corporation	Hitoshi Sato

Technical Working Group

Leader	Canon Inc.	Yoshiro Udagawa
Sub Leader	Olympus Corporation	Hideaki Yoshida
Sub Leader	NIKON CORPORATION	Hideo Hoshuyama

DCG-001 Sub-Working Group

Chief	Olympus Corporation	Hideaki Yoshida
	Canon Inc.	Yoshiro Udagawa
	Canon Inc.	Makoto Sekita
	Canon Inc.	Masao Suzuki
	SIGMA CORPORATION	Naoto Yabase
	Sony Imaging Products & Solutions Inc.	Naoya Katoh
	Sony Imaging Products & Solutions Inc.	Daisuke Kuroda
	Sony Imaging Products & Solutions Inc.	Katsuya Fujiwara
	Sony Imaging Products & Solutions Inc.	Satoshi Nakamura
	Tamron Co., Ltd.	Minoru Ando
	Tamron Co., Ltd.	Kimiaki Nakazawa
	NIKON CORPORATION	Akihiko Obama
	NIKON CORPORATION	Koichi Ohshita
	Panasonic Corporation	Masaaki Nakayama
	Panasonic Corporation	Yasuhiro Shingu
	FUJIFILM Corporation	Shigeru Kondo
	Ricoh Company, Ltd.	Masakazu Saori
	Ricoh Company, Ltd.	Isamu Hirai

Documentation Rule Sub-Working Group

Chief	Olympus Corporation	Akinori Mitsuse
	Olympus Corporation	Masayuki Yoshikawa

CASIO COMPUTER CO., LTD.

Canon Inc.

Canon Inc.

SIGMA CORPORATION

SIGMA CORPORATION

SEIKO EPSON CORPORATION

Sony Imaging Products & Solutions Inc.

Sony Imaging Products & Solutions Inc.

Tamron Co., Ltd.

NIKON CORPORATION

NIKON CORPORATION

Panasonic Corporation

Ricoh Company, Ltd.

Akihiko Miwa

Masahiro Kobayashi

Hiroyuki Ootsuka

Akira Kashiwaba

Teruaki Kuwayama

Ryuichi Shiohara

Yutaka Iwatsuki

Akira Shiraishi

Masamichi Kinjo

Hideyuki Miyoshi

Hiroki Igawa

Hironori Katsuura

Isamu Hirai

Any and all standards and guidelines published by CIPA have been set forth without examining any possibility of infringement or violation of Intellectual Property Rights (patent right, utility model right, trademark right, design right, copyright and any other rights or legal interests of the same kind).

In no event shall CIPA be liable in terms of Intellectual Property Rights for the contents of such standards and guidelines.

CIPA DCG- 001-Translation-2018

Individual Guidelines for noting digital camera specifications on Number of pixels, Image file and Focal length of the lens

Published by Camera & Imaging Products Association
MA Shibaura BLDG., 3-8-10, Shibaura, Minato-ku, Tokyo, 108-0023 Japan
TEL +81-3-5442-4800 FAX +81-3-5442-4801

All rights reserved

No part of this guideline may be reproduced in any form or by any means without prior permission from the publisher.