
**Photography — Digital cameras
— Chromatic displacement
measurements**

*Photographie — Caméras numériques — Mesurages du
déplacement chromatique*

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 42, *Photography*.

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Introduction

Digital still camera images sometimes experience a type of artefact known as chromatic displacement. These artefacts generally appear as colour fringe at boundaries that separate dark and light features. This International Standard defines this type of artefact as chromatic displacement regardless of the source. In the case of multi-sensor digital still cameras, chromatic displacement may be caused by optical, mechanical and electrical factors. In the case of single sensor digital still cameras, there are almost no mechanical and electrical factors, so the chromatic displacement is mainly generated by optical factors and artefacts caused by a mosaic colour filter array. Optical aberrations include lateral chromatic aberration, longitudinal chromatic aberration and comatic aberration.

Lateral chromatic aberration arises when the size of an image changes with the wavelengths of light. Because of this, lateral chromatic aberration is more conspicuous at the peripheral part of the image. Lateral chromatic aberration is rotationally symmetric in an ideal case; however this might not be the case due to manufacturing tolerances.

Longitudinal chromatic aberration arises when the back focus changes with the wavelength of light. Unlike lateral chromatic aberration, longitudinal chromatic aberration may be conspicuous not only in the peripheral part of the image but also in the central portion of the image.

Chromatic displacement by comatic aberration arises when the characteristic of a comatic aberration changes with the wavelengths of light. This phenomenon, known as purple fringe or a colour fringe, is conspicuous at the peripheral part of the image like lateral chromatic aberration. In many cases, comatic aberration can be reduced by using a larger lens f-number (smaller aperture).

Chromatic displacement is emphasized or reduced by image processing.

To measure chromatic displacement, IEC 61146-2 is established by IEC and CIPA DCG-002-2012 based on IEC 61146-2 is also established by CIPA. Furthermore, P1858 - *Standard for Camera Phone Image Quality (CPIQ)* is being developed by IEEE.

This International Standard defines two methods for measuring, the Chromatic displacement and Radial chromatic displacement. Chromatic displacement measures total chromatic displacement encompassing all factors as provided by IEC 61146-2 and CIPA DCG-002-2012. Radial chromatic displacement which measures optical aberration is based on a method developed by the CPIQ and is a main factor in the chromatic aberration of a single sensor digital still camera.

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Photography — Digital cameras — Chromatic displacement measurements

1 Scope

This International Standard specifies the definition of chromatic displacement for digital still cameras, test patterns, measurement conditions and methods, so as to enable the comparison of the results of measurement.

The methods of measurement are designed to enable the assessment of the performance of digital still cameras by using image data output by the digital still cameras.

This International Standard does not specify the allowable amount of chromatic displacement.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

chromatic displacement

shift in location of features of different colours in the output image caused by optical, mechanical, electrical and image processing factors

Note 1 to entry: Optical factor include lateral chromatic aberration, longitudinal chromatic aberration, characteristic comatic aberration and others.

Note 2 to entry: It is the displacement of the red (R) and the blue (B) channel in relation to the green (G) channel in an output image.

Note 3 to entry: Chromatic displacement is evaluated by measuring the chromatic displacement in the lateral direction in the image.

2.2

radial chromatic displacement

radial shift in location of different colours in the output image caused by the optical factor called lateral chromatic aberration that may then be influenced by mechanical, electrical and image processing factors

3 Test conditions and methods

3.1 General

The measurement shall be carried out using the digital signals of the output images from the digital still camera with which the test chart is captured.

The following measurement conditions should be used as nominal conditions when measuring the chromatic displacement of a digital still camera. If it is not possible or appropriate to achieve these nominal operating conditions, the actual operating conditions shall be listed along with the reported results.

3.2 Apparatus and hardware

Each test chart shall be specified, together with the lighting conditions such as illuminance, luminance and colour temperature of illumination.