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

*Photographie — Caméras numériques — Mesurages du
déplacement chromatique*



This document is a preview generated by EMS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Terms and definitions	1
3 Test conditions and methods	1
3.1 General.....	1
3.2 Apparatus and hardware.....	1
3.2.1 Lighting.....	2
3.2.2 Test chart.....	2
3.3 Arrangement of measuring equipment.....	4
3.3.1 Reflective test chart.....	4
3.3.2 Transmissive test chart.....	4
3.3.3 Positioning of the camera.....	5
3.4 Image/camera settings.....	6
4 Analytical approach	6
4.1 General.....	6
4.2 Determination of displacement.....	6
4.2.1 Dot chart.....	6
4.2.2 V pattern chart.....	7
4.3 Chromatic displacement (CD).....	8
4.3.1 Numerical definition.....	8
4.4 Radial chromatic displacement (RCD).....	9
4.4.1 Numerical definition.....	9
5 Presentations of results	10
5.1 Chromatic displacement.....	10
5.2 Radial chromatic displacement.....	11
Annex A (informative) Extracting the dots from the target	13
Bibliography	14

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

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.

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.