How International Standards affect Camera Testing

October 2008
In the beginning

- When I started testing cameras in 1997 I sat there and asked myself: how the hell shall I do that?
The unlimited number of standards

Isn’t there a standard method how to test cameras?
There are several:

ISO 12231: Terminology
ISO 12232: Determination of ISO speed
ISO 12233: Resolution measurements
ISO 12234: Removable memory -
  Part 1: Basic removable memory reference model
  Part 2: Image data format - TIFF/EP
ISO 14524: Methods for measuring opto-electronic conversion functions (OECF)
ISO 15739: Noise measurements
ISO 15740: Picture Transfer Protocol (PTP)
for Digital Still Photography Devices
The unlimited number of standards

ISO 15781: Measuring shooting time lag, shutter release time lag, shooting rate, and start-up time

ISO 17321: Graphic technology and photography
Colour characterisation of digital still cameras
Part 1: Stimuli, metrology, and test procedures

ISO 20462: Psychophysical experimental method to estimate image quality
Part 1: Overview of psychophysical elements
Part 2: Triplet comparison method
Part 3: Quality ruler method

ISO 22028: Extended colour encodings for digital image storage, manipulation and interchange
Part 1: Architecture and requirements
Part 2: ROMM RGB
Part 3: RIMM RGB
Part 4: ECI RGB
The unlimited number of standards

Standardisation committees:

• International Organization for Standardization (ISO) Technical Committee (TC) 42, Working Group 18

• Cell Phone Image Quality Group organized by International Imaging Industry Association (I3A)

• International Electrotechnical Commission (IEC) Technical Committee (TC) 100

• Related Organisations: ICC, CIE, SMPTE
Digital Camera Tests

Values which can be measured:

• Resolution (s)
• Dynamic Range (s)
• Used digital values (s)
• Noise (s)
• Color Reproduction (s)
• White Balance (s)
• Vignetting (s)
• Distortion (s)
• Power consumption
• Dead Pixels
Digital Camera Tests

Values which can be measured:

- Max. scaling
- Flash uniformity and guide number
- Lateral chromatic aberration (s)
- Color shading
- Noise based on human perception (s?)
- Shutter and shooting lag (s?)
- Startup time and shooting rate (s?)
- Image stabilization (s?)
Digital Camera Tests

• Principle
Digital Camera Tests

• Principle

- calibrated spectral photometer
- test chart
- light source tungsten or filtered to D55
Standards are not God given

• Several problems occurred
Standards are not God given

• Several problems occurred
Digital Camera Tests

- resolution measurement
Finding new methods

• Signal to noise vs. Visual noise

SNx = 27

SNx = 29
Digital Camera Tests

• color reproduction quality
Digital Camera Tests

- color reproduction quality
Digital Camera Tests

• color reproduction quality
Digital Camera Tests

- shutter and shooting lag
Digital Camera Tests

• Welcome: Steve ("Stabilizer Evaluation Equipment")
Digital Camera Tests
Digital Camera Tests

- OECF, Speed, and Noise (ISO 14524, 15739)
Digital Camera Tests

- OECF, Speed, and Noise (ISO 14524, 15739)
Digital Camera Tests

- vignetting / corner shading
Digital Camera Tests

• vignetting / corner shading
Digital Camera Tests

- distortion
Digital Camera Tests

- chromatic aberration
Digital Camera Tests

- power consumption test
Digital Camera Tests

- power consumption and shooting rate
Digital Camera Tests

• max. scale
Digital Camera Tests

- Flash: uniformity and guide number
Digital Camera Tests

- resolution measurement
Digital Camera Tests

• resolution measurement
Digital Camera Tests

• resolution measurement
Digital Camera Tests

• Measuring spectral sensitivities
Digital Camera Tests

• Measuring spectral sensitivities

![Nikon D70 spectral response graph](image.png)

- R_IF
- G_IF
- B_IF
- R_LED
- G_LED
- B_LED
- R_mono
- G_mono
- B_mono

wavelength [nm]