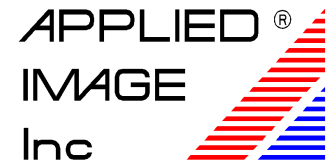


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**QA-100-RM**  
ISO-12233:2023 Edge SFR Chart  
Product Specifications



Catalog Part No: **QA-100-1-20-RM** (1x size – 4:1 slants, 20:1 OECF, on photographic paper)

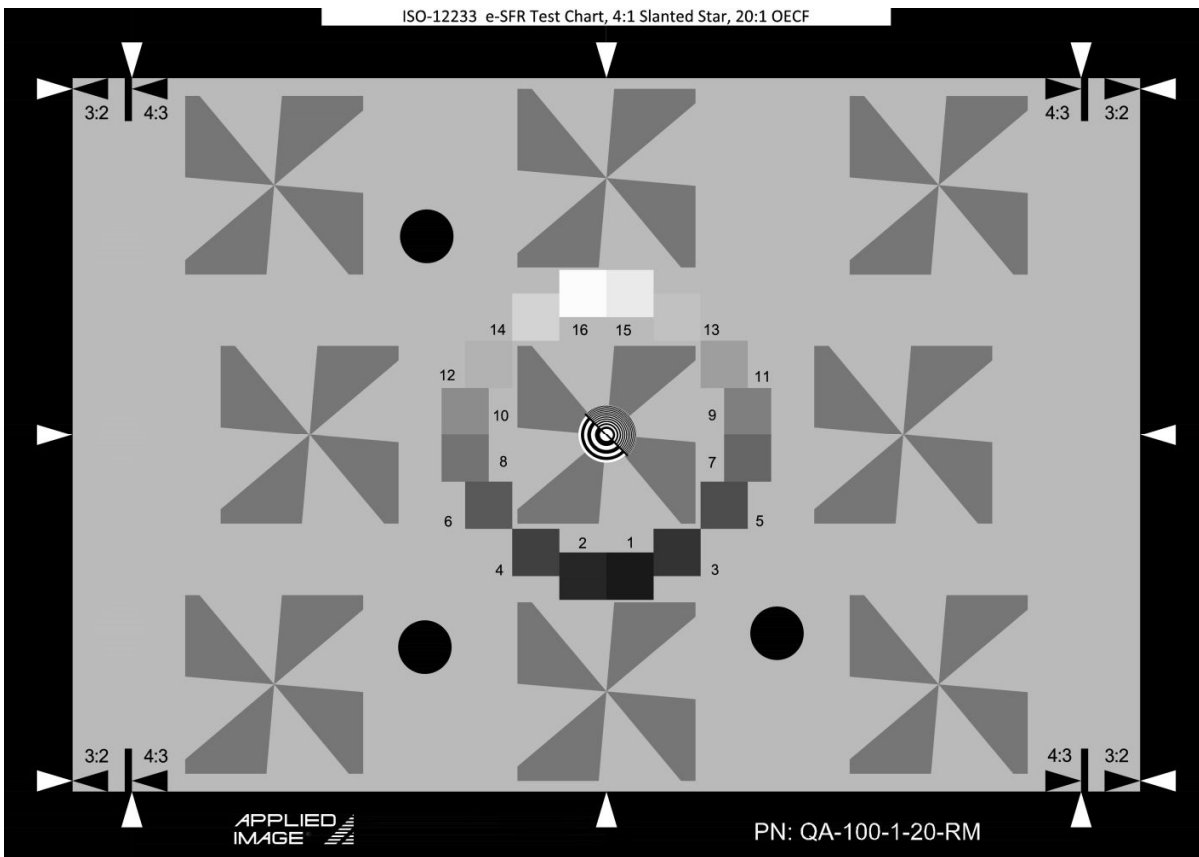
**QA-100-1-80-RM** (1x size – 10:1 slants, 80:1 OECF, on photographic paper)

**QA-100-2-20-RM** (0.5x size – 4:1 slants, 20:1 OECF, on photographic paper)

**QA-100-3-20-RM** (2x size – 4:1 slants, 20:1 OECF, on photographic paper)

Product Name: **ISO-12233:2023 Edge SFR Chart**

Drawing / Photo of part:



The above image is an approximate representation of the actual product.  
Specifications are subject to change without notice.

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Description:

This test pattern is an image evaluation tool for determination of resolving power, limiting resolution and spatial frequency response (SFR) of digital image systems at a low contrast signal point. The central OECF grayscale patches are spectrally neutral and can be used to evaluate linearity.

Sizes and Image Forming Material:

<i>Part Number</i>	<i>Size</i>	<i>Substrate Size (mm)</i>	<i>Active Image Area (mm)</i>	<i>Substrate Type</i>	<i>Image Forming Material</i>
QA-100-1-20-RM	1X	340 x 240	300 x 200	Photographic paper	Photographic emulsion
QA-100-1-80-RM	1X	340 x 240	300 x 200	Photographic paper	Photographic emulsion
QA-100-2-20-RM	0.5X	170 x 120	150 x 100	Photographic paper	Photographic emulsion
QA-100-3-20-RM	2X	680 x 480	600 x 400	Photographic paper	Photographic emulsion


Image Description:

The **ISO-12233:2023 Low Contrast Edge SFR chart with OECF Patches** contains a new version of the slant edge test pattern, users are advised to refer to International Standard ISO-12233:2023 for a detailed explanation of the target's features and their use. The following is a summary list of image features.

- 1X size, 340 x 240 mm size, photographic material
- Framing arrows which define 4:3 and 3:2 aspect ratios assist in framing the target's active area.
- A central multi-frequency zone plate can be used to set focus.
- Four-cycle slanted star test patterns with 4:1 edge reflectance ratio provide Edge SFR (e-SFR) at multiple locations.
- Spectrally neutral gray scale patches with 20:1 luminance ratio used to determine the optoelectronic conversion functions (OECFs) described in ISO 14524

Polarity: Positive image features

Image Contrast: The background reflectance varies with the particular chart used. See ISO 12233:2023 for values.

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### Terms:

- *Aliasing* – The appearance of image artifacts due to limited or diminished resolution.
- *Aliasing ratio* – The quantity of image distortion due to aliasing expressed as the ratio of maximum minus minimum response to the average response within a burst pattern (a series of line and space features at a slight angle to the image sensor).
- *Image aspect ratio* – The ratio of image width to image height.
- *Resolution* – The measure of a camera or imaging component to convey detail.
- *SFR (Spatial Frequency Response)* – The amplitude response of an imaging system as a function of relative spatial frequency.
- *Spectrally neutral* – Spectral power distributions of equal value.

### Guidelines for Usage:

This document is not intended to replace the International Standard Document ISO-12233:2023. However, the following guidelines will aid the first use of this chart.

- The chart should be illuminated uniformly ( $\pm 10\%$  of center luminance) against a surround of low reflectance and with a minimum of flare light. The illuminant should be effectively neutral with respect to either daylight or tungsten illuminants (ISO-7589). Camera white balance should be adjusted to provide equal red, green and blue signal levels.
- The camera should be positioned to provide centered, full-frame-height rendering of the chart's active area. Use the chart's framing arrows and horizontal edges to aid positioning. The camera to test chart distance should be noted.
- Use the chart's central zone plate feature to set good focus.
- Set camera lens aperture and exposure time to provide maximum signal from white areas while avoiding any signal clipping.
- Where possible, image compression features should be disabled.
- Camera output signal should be linearized using the standard reflection camera OECF (Opto-Electronic Conversion Function) test chart, Applied Image part number ST-52-RM, or the test patches provided on this chart.

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Applied Image is making available, as a free download, its ImageCheck V1 Software to evaluate the Opto-Electronic Transform Function (OECF) and Spatial Frequency Response (SFR) using the slanted-edge method for this and other test charts. Download here:

<https://www.appliedimage.com/applied-imagecheck-vers-1-software/>

Slant-edge features can be analyzed using SFR software available through:

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Software that performs the e-SFR measurement algorithm specified in ISO 12233 can be accessed from <http://www.iso.org/12233>.

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ImageJ is a handy image analysis tool, with many plugins, including one for mtf analysis;

<https://imagej.net/Welcome>  
<https://imagej.net/plugins/se-mtf/index.html>

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#### Related Information:

- International Standard Document ISO-7589, *Illuminants for sensitometry – Specifications for daylight and incandescent tungsten*
- International Standard Document ISO-12233, *Electronic still-picture cameras – Resolution measurements*
- International Standard Document ISO-14524, *Electronic still-picture cameras – Methods for measuring opto-electronic conversion functions (OECFs)*

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Related Applied Image Products:

- M-13-60; Sinusoidal Array. Sinusoidal test images evaluated for MTF (Modulation Transfer Function) are the classic means of imaging quality evaluation. (MTF is comparable to SFR evaluation.)
- QA-61; Reflective Scanner Test Chart (ISO-16067-1). Designed for scanners, this chart contains a slanted edge feature for SFR evaluation. Additional features are included for resolution, aliasing ratio and OECF testing.
- QA-62; Slant Edge Target. Designed for scanners, this chart contains a slanted edge feature for SFR evaluation along with an OECF grayscale in a single target.
- QA-76; Digital CINE Resolution Chart. Based on the ISO-12233 chart, the QA-76 has extended width for devices having higher aspect ratios.
- QA-77; Enhanced Digital Camera Resolution Chart. This target is based on the ISO-12233 chart but allows determination of resolution limits as high as 4000 lw/ph (line width per picture height). Lower contrast slant edge features provide more accurate SFR analysis.
- QA-72; Digital Still Camera Resolution Chart
- QA-72A; ISO 12233 CIPA Resolution Chart.
- QA-72C; ISO 12233 Low Contrast Edge SFR Chart