

# ColorChecker Project - Copycats

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# Introduction

The success of the ColorChecker® has resulted in several companies attempting to copy the ColorChecker products. Among these copies are the Spyder Checkrs from Datacolor, the Pixel Perfect charts and the greywhitebalancecolourcard. There have also been a succession of companies that have quickly entered the market and just as quickly vanished.

## Datacolor

Datacolor, first introduced their ColorChecker copies at Photokina 2010. Known as the Spyder Checkr product line, just as the ColorChecker has grown into a family of products, so have the Datacolor charts. Currently the Spyder Checkr family exists in several formats.

Although the color patches are chosen to be similar to the ones of the original ColorChecker®, they are not presented in the same arrangement. This may be an attempt to circumvent the ColorChecker design copyright.

### Spyder Checkr 48 (SCK100)

This is the original Datacolor chart product, consisting of a plastic hinged case, 16.8 cm x 23 cm, with two double sided charts that can be presented two charts at a time. Each chart (13.65 cm x 21.8 cm) is held in place within the case by a black plastic grid with magnetic closures. In addition, the case can be attached to a tripod with a 1/4-20 screw. At the top of the chart a calibration cube (Spyder Cube SC100) can be attached a 1/4-20 stud to provide additional gray patches, a black trap and a silver reflective ball.



Spyder Checker 48 (SCK100)



Spyder Cube SC100



Each chart has 24 color patches (27 mm square) on one side and 7 grayscale patches on the reverse (6 27 mm square patches, one large 88 mm x 181 mm patch). The chart can be configured to display 48 colors, 24 colors and 7 grays, or 14 gray patches. There is also an exposure indicator (called the FadeCheckr) which turns from red to yellow when the chart has been exposed to about 30 days of full summer sun. At that time the chart pages should be replaced with new ones.

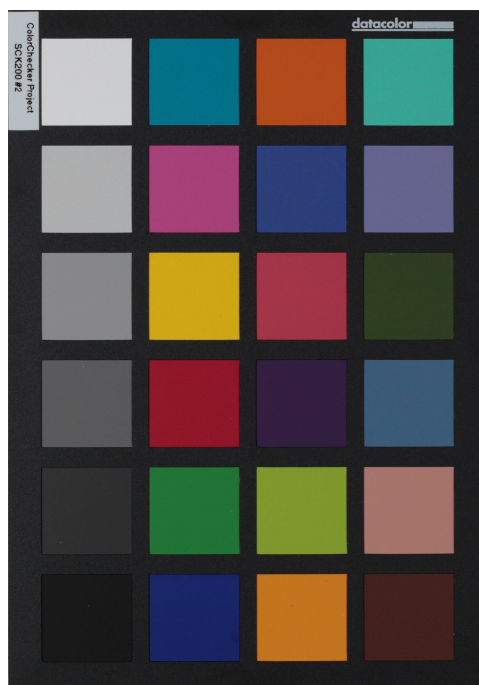
There are replacement charts available for when the FadeCheckr indicates the charts may have faded and should be replaced.

The patches have a matte surface and are paint applied to a white, optically brightened, plastic substrate.

### **Spyder Checkr 24 (SCK200)**

The Spyder Checkr is also available as a single two-sided chart, 13.8 x 19.7 cm, without a plastic case as the Spyder Checkr 24. One side consists of 24 color patches, each 25 mm square. The other side has 7 gray patches; 6 are 25 mm square, and a large one 87 mm x 179 mm. This chart is provided in a protective plastic sleeve. The Spyder Checkr 24 charts are smaller than the ones for the Spyder Checkr 48 and are not meant as replacement charts.

As in the Spyder Checkr 48, these patches have a matte surface and are paint applied to a white plastic substrate which is optically brightened.



## Spyder Checkr Photo (SCK300, SCK310)

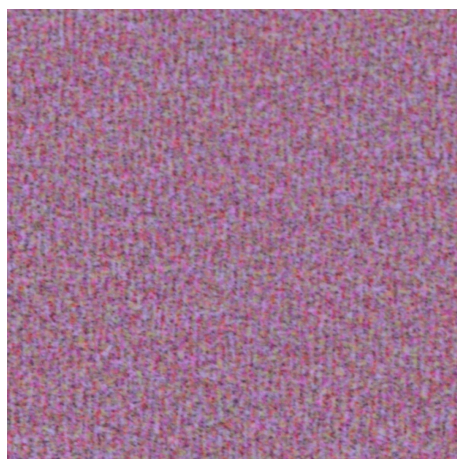
Offered as a competitor to the ColorChecker Passport is the Spyder Checkr Photo. Produced in a pocket size, this product comes with 4 charts which can be shown two at a time. Originally released as the SCK300 with a rectangular case, the case was changed to one with some curved insets to the case and the product was renamed as the SCK310. It is claimed that these insets allow for a more ergonomic design that fits more comfortably and securely in the hand. The size of the current SCK310 case is 97.5 mm x 122.1 mm. Each chart is 65.9 mm x 106.4 mm. There are two color charts, each consisting of 24 12 mm square patches. In addition there are two gray charts, each with 6 12 mm gray patches and one large 38.9 mm x 86.5 patch. On one gray chart the large patch is a light gray used for white balancing a camera, the large patch on the other gray card is used for gray balancing a camera.



Spyder Checkr Photo SCK300

Spyder Checkr Photo SCK310

Each chart consists of three layers; the topmost is a black plastic grid overlay; the middle layer is an archival paper, without optical brighteners, with the color patches very finely inkjetted upon it; and the bottom layer is a white, optically brightened plastic material. A stochastic pattern has been used for the inkjet dot placement which produces a more uniform pattern to the patches. The patches have a matte surface.



Spyder Checkr Photo dot pattern.

## Currently Available Spyder Checkr Charts

| Model               | Patches | Surface | Inches      | Millimeters     | Note                        |
|---------------------|---------|---------|-------------|-----------------|-----------------------------|
| Spyder Checkr 48    | 48      | Matte   | 6.63 x 9.06 | 168.273 x 230.0 | 2 charts visible at a time. |
| Spyder Checkr 24    | 24      | Matte   | 5.44 x 7.75 | 138 x 196.85    |                             |
| Spyder Checkr Photo | 48      | Matte   | 3.84 x 4.81 | 97.5 x 122.1    | 2 charts visible at a time. |
| Spyder Checkr Video | 24      | Glossy  | 3.8 x 4.81  | 97.5 x 122.1    | 2 charts visible at a time. |

## Spyder Checkrs Analyzed

A group of Spyder Checkrs of varying ages and sizes were assembled for testing.

To simulate the original ColorChecker measurement conditions as closely as possible, each chart was measured with a ColorEye XTH integrating sphere instrument using the SpectraShop™ 6 program. The measured spectral range was then reduced from the instrument's 360 to 750 nm span to the range of 400 to 700 nm, to better match the original 1976 published data. This reduced spectral range data was converted to L\*a\*b\* values in Spectrashop.

The original 1976 colorimetric coordinates<sup>1</sup> were converted from xyY to XYZ then to L\*a\*b\* values to provide the reference color designations for the patches. The calculations were made using one of the author's programs, but there are many online resources for the conversions. One such resource is on Bruce Lindbloom's website.<sup>2</sup>

Here is a list of the Spyder Checkrs used for the comparisons and their date of manufacture, if known.

| Chart               | Product # | Date                   |
|---------------------|-----------|------------------------|
| Spyder Checkr 48    | SCK100    | 2010                   |
| Spyder Checkr 48    | SCK100    | 2025                   |
| Spyder Checkr 24    | SCK200    | 2014                   |
| Spyder Checkr 24    | SCK200    | 2025                   |
| Spyder Checkr Photo | SCK300    | 2022                   |
| Spyder Checkr Photo | SCK310    | 2026                   |
| Spyder Checkr Photo | SCK3      | 2025 Replacement cards |

To provide a visual method for assessing the differences between the charts, a color coded difference chart was created for each comparison.

How close are the painted Spyder Checkr charts to the original ColorChecker 1976 definition?



1976 L\*a\*b\* vs. Checkr SCK100 #1  
Average ΔE: 2.89  
Peak ΔE: 7.66



1976 L\*a\*b\* vs. Checkr SCK100 #2  
Average ΔE: 3.14  
Peak ΔE: 7.13

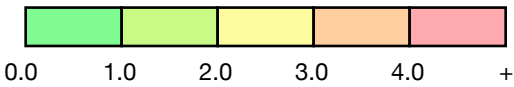


1976 L\*a\*b\* vs. Checkr SCK200 #1  
Average ΔE: 3.28  
Peak ΔE: 6.93



1976 L\*a\*b\* vs. Checkr SCK200 #2  
Average ΔE: 3.13  
Peak ΔE: 8.10

Difference Color Key



ΔE Units

# How close are the inkjet Spyder Checkr charts to the original ColorChecker 1976 definition?



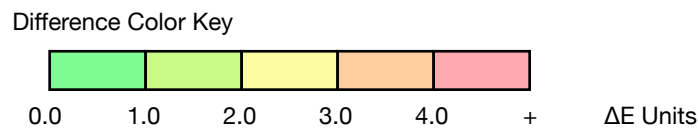
2021 Average vs. Checkr SCK300 #1  
 Average ΔE: 3.34  
 Peak ΔE: 12.03



2021 Average vs. Checkr SCK310 #1  
 Average ΔE: 3.37  
 Peak ΔE: 8.15

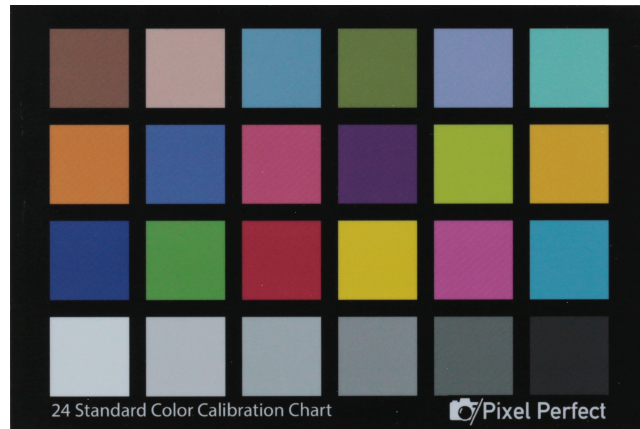


2021 Average vs. SCK3 #1  
 Average ΔE: 3.43  
 Peak ΔE: 8.88

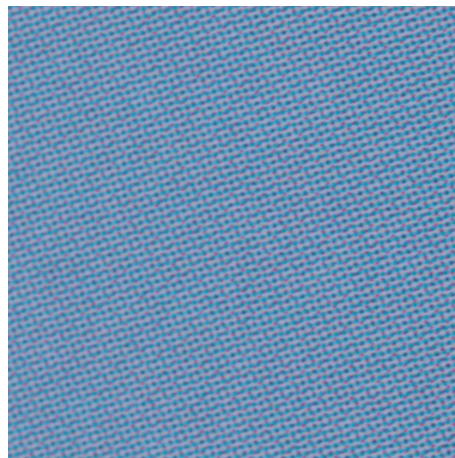


## Pixel Perfect

Available from Amazon, and other sources, are the Pixel Perfect camera calibration charts. These are double sided charts; one side with a pattern of colors closely resembling the ColorChecker, the other side with a single large gray patch.



The colors have been printed using a 200 lpi halftone screen on a white plastic substrate. The traditional halftone rosette is easily visible.



Pixel Perfect halftone pattern.

There is a black printed grid surrounding the color patches. The chart substrate is translucent, making it important to consider the backing used during measuring and photographing the charts.

The charts are available in a 4 x 6 and a 5 x 7 inch size. They are bundled two charts to a package.

There is an online profiling guide but there is no product or company website. The only way to contact the manufacturer is a gmail help address.

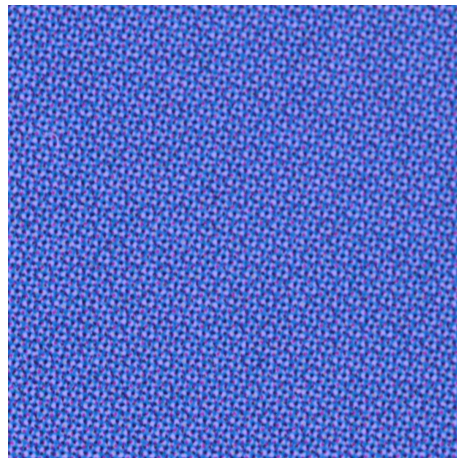


## Greywhitebalancecolourcard

Available from the website [gwbcolourcard.uk](http://gwbcolourcard.uk) are several camera calibration charts. These are double sided charts; one side with a pattern of colors closely resembling



the ColorChecker, the other side with three large patches in black, gray and white.



Greywhitebalancecolour card halftone pattern.

The colors have been printed using a 200 lpi halftone screen upon a white plastic substrate. The traditional halftone rosette is easily visible.

The charts are available with either a black or white printed grid surrounding the color patches. The chart substrate is opaque. Only the black surround charts are analyzed

here because photographing a chart with white patch surrounds would increase the veiling glare and lighten the image patch colors.

The charts are available in a 140mm x 88mm postcard size and an 86mm x 54mm business card size. They are bundled two charts to a package. There are also several 28 patch color charts that do not resemble the ColorChecker color layout. These 28 patch charts are available in the same 140mm x 88mm and 86mm x 54mm sizes.

Recently the product line has been expanded to include a double-sided chart with one side presenting a ColorChecker color arrangement, along with a gray balance patch and four color balance adjustment patches. The other side is intended for video use and has some additional color patches and four neutral stripes for matte black, white, medium gray and gloss black. These charts are available in a 190mm x 80mm format.

## Conclusion

Color difference charts were not prepared for the Pixel Perfect and Greywhitebalancecolour cards because all their patches were more than 4  $\Delta E$  units from the ColorChecker patches. This made them unsuitable as ColorChecker replacements.

However, if each of these charts were individually measured and reference files prepared, they might be suitable for color management purposes.



## References

1. C. S. McCamy, H. Marcus and J. G. Davidson, "A Color-Rendition Chart", Journal of Applied Photographic Engineering, Vol. 2, Num. 3, Summer 1976, pp. 95-99.
2. CIE Color Calculator located at <http://www.brucelindbloom.com/>. Click on the Calc button then the CIE Color Calculator link.

## Resources

1. ColorChecker [calibrite.com](http://calibrite.com)
2. Pixel Perfect [amazon.com](http://amazon.com)
3. GreyWhiteBalanceColourCard [gwbcourcard.uk](http://gwbcourcard.uk)