

# QS-Barcode Recognition

QS QualitySoft GmbH offers effective software for recognizing barcodes from digital images and Adobe PDF documents. The images are scanned or faxed forms or from digital cameras. An almost unlimited numbers of barcodes can be read from an image.

This paper deals with some basic information about linear and 2D barcodes. Technical characteristics of the barcode images are discussed as well.

At the end the QualitySoft software products for barcode recognition are introduced.

## Linear Barcodes

Linear barcodes consist of bars and spaces. The information is encoded in the width of the lines. The height of the barcode is not of importance as long as a minimum height is given. There are a lot of barcode symbologies. The most common are Code 39, Code 128 and the product marking codes (EAN, UPC, GTIN, GS1 DataBar).

Code 39 is a very simple symbology. Each character consists of 5 bars and 4 spaces. 3 of these lines are wide and 6 are narrow, there are 2 widths of bars/spaces. The first and last character is the '\*' character to mark the start and the end of the barcode.

Code 39 is available as a font from many sources.

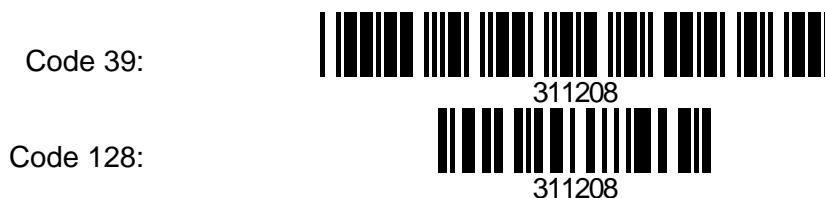
To convert a number into barcode just use your editor program: type the number, add a star character '\*' before and behind the number and change the font to Code 39.

The character set of Code 39 includes numbers and upper letters, "Code 39 extended" contains lower letters as well.

The main disadvantage is that Code 39 requires a lot of space. A Code 39 barcode containing 8 characters needs 50 black bars.



Code 128 needs only 34 black bars for the same content. The bars/spaces however have up to 4 different width. The print quality for this code must be higher.



If you can do without the dots in our sample (that means encode just 311208 instead of 31.12.08) the Code 39 is reduced from 50 to 40 black bars. The Code 128 needs only 19 black bars instead of 34.

Code 128 uses 3 different characters set. If only digits are encoded the needed space is minimized.

To generate Code 128 special software is needed. Code 128 is a symbology which is used in many fields, e.g. as EAN 128.

## Product Marking Codes (Trade Codes)

In 1971 the adoption of the Global Trade Item Number GTIN started. It helps to “identify everything anywhere”.

Soon the number was not only printed on the product but also encoded in barcodes (UPC and EAN). The next step will be the worldwide adoption of a new barcode symbol GS1 DataBar for use at the points of sale.

Actually GS1 DataBar is a whole family of codes (previously called RSS Reduced Space Symbologies). One aim is to put more information into the barcode, not only the item number but also so-called Application Identifiers (AI) such as production or expiration date, weight, price.

Based on the all-purpose Code 128 special-purpose codes are defined such as EAN 128, SSCC (Serial Shipping Container Code) and many other. The data format and data structure within the code are defined and often they include a special string to distinguish the barcodes from others.

## Further Barcodes

With QualitySoft products you can read many other symbologies:

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### Linear Barcodes supported

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Code 39 / Code 39 extended

Code 2/5 interleaved, Code 2 of 5 industry and many others subtypes

Code 128 / Codablock F

GS1 DataBar (PoS)

EAN 8 / EAN 13 with addons, UPC A / UPC E

EAN 128 / UCC 128

Code 11, Code 32 / Italian Pharma Code, Code 93 / Code 93 extended, Codabar

Patchcode, Pharmacode (one track)

Two Track Pharmacode and 2D Pharmacode **on demand**

Post-Codes: Royal Mail Barcode, Dutch Code KIX, Australian, Canadian CPC, Code One, Intelligent Mail Barcode IMB, PostBar, PostNet, Planet Code

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More information about the barcode types and sample images are included in our freeware bcTester, download **bcTester** from <http://www.bctester.de/en>.

If you miss a symbology or if you wonder what code you see, please contact us or send the image of the code. We will do our best to help you.

## 2D Barcodes

To minimize the required space and encode more data into a barcode the **two dimensional** bar codes were invented. You can encode both alpha-numeric characters and binary data. Due to integrated error correction 2D barcodes are more tolerant towards data errors that occur while printing or scanning. The common industry standards "Aztec", "Data Matrix", "PDF 417" and "QR Code" are supported by QualitySoft products.



311208

Needed space for the same content  
Code 128



QR Code



Data Matrix

2D barcodes can replace linear barcodes and are much smaller. 2D barcodes can be printed or attached to documents without attracting much attention. They do not interfere as much with the design of a document as the "ugly" linear barcodes do. They are also used to identify very tiny parts like electronic components or small tubes in laboratories.

Samples for very small data matrix barcodes, used by our customers:



Catalog of a distributor for sanitary products  
Our partner developed a very cheap wand  
to read the order numbers quickly and safely.



Pencil with two tubes  
Barcode are read with our bcWebCam  
software, the web cam uses  
an inexpensive "digital microscope".

Large 2D barcodes can store much more data than linear barcodes. The large amount of data and the possibility to encrypt the data in the barcode opens up many new applications such as the "digital postage" (Stampit of the German Post) or the online ticket of the German Railway.



**Aztec Code** is used for the Online Tickets of Deutsche Bahn (German Railway).  
The sample code contains 292 bytes.

rdung 1



Data Matrix was designed for small parts marking and is currently used for small electrical parts, by the pharmaceutical industry for unit dose packaging, by the automotive industry and by NASA.

The PDF417 barcode consists of several lines. You can encode the whole character set, up to 1850 characters. It is variable in width and height.



The **QR Code** (Quick Response Code) was designed in Japan and can contain a lot of japanese characters (Kanji). It is often used in Asia.

## Technique / Barcode Quality

As we read barcodes from images, it is important that the digital version of the barcode in the image data is of high quality. The size of the barcode on the image results from the size of the printed barcode and the image generation technique (scanner or camera resolution). Both factors must fit together in order to read barcodes well.

Scanning for archives is usually done with a resolution of 200 or 300 dpi (Dots per Inch). For correct barcode reading at such low resolutions, barcodes must be printed clearly; in particular, the bars must not be too narrow. Recommended is a maximum of 2 characters/cm at 200 dpi and 3 characters/cm at 300 dpi. E.g. an 8-digit bar code should have a width of 4 cm to be read properly at 200 dpi.

The thinnest lines and gaps in the images of linear bar codes should not be less than four pixels (dots) to ensure a reliable reading.

Most 2D bar codes consist of small black and white squares. Each of these data elements should be at least 7 dots (pixels) in the image to make a reliable reading possible.

If your scan resolution is 200 dpi, you should put not more than 5 black squares of the zebra pattern into 1 cm on the paper.



Code 128 (6 char.)  
3 cm wide



Data Matrix (6 char.)  
1\*1 cm



Data Matrix (58 char.)  
5\*1.8 cm

**Samples of recommended original size** for scanning with a **resolution of 200dpi**.  
**For higher scanner resolution accordingly smaller barcodes can be used.**

In addition to scanner resolution and barcode width, reliable recognition also depends on other factors such as quality of printer and paper, scanner settings, barcode type, height and width of barcode, number of characters in the barcode.

When Cameras are used for image production, also light exposure, sharpness, distortion and image data compression play a big role in getting good images.

**QS-Barcode** offers a number of parameters to ensure the quality of recognition if the basic conditions are met.

Note: Errors occur as well in the process of generating and printing the barcodes. It happens that the form fields are too small, so that not all bars fit into the field. The special characters that mark the beginning and the end of the barcode could be missing. When generating PDF files, barcode fonts must be embedded.

For further discussion and detailed information of professional barcode printing, we recommend a look at the pages of our partners.

Before **QS-Barcode** is used in daily routine, it is strongly recommended to perform a larger test using the suggested bar code under real production conditions.

For more details have a look at our white paper "Barcode not recognized - What can I do", download [http://www.qualitysoft.de/en/download/bctipps\\_en.pdf](http://www.qualitysoft.de/en/download/bctipps_en.pdf).

## Barcode Recognition - Products

QS QualitySoft offers several software products for barcode recognition from images. Look at the following overview. Latest details and pricing information can be found at [www.qualitysoft.de](http://www.qualitysoft.de). Please use our FREEWARE and free evaluation copies to perform large tests with your barcodes.

### QS-DocumentAssembler (Windows Application)

#### Barcode Recognition - No Programming Required!

**QS-DocumentAssembler** works true to this motto. This Windows application recognizes barcodes from scanned documents and processes documents automatically based on barcode data. Document sorting, indexing and grouping is performed based on the selected settings.

### QS-Barcode SDK (Software Development Kit)

#### Use barcode recognition in your own application

With **QS-Barcode SDK** (software development kit) it is quick and easy to integrate barcode recognition in any environment.

The SDK comes with many integration examples (C, C#, Java, VB6, VB.NET, Delphi). It contains LIB, DLL and OCX components and supports file and memory interfaces. Extensive developer documentation describes the integration process and contains all relevant interface information.

### QS-Barcode bcWebCam

#### Use your web cam as a barcode reader

bcWebCam Version 2.1 reads EAN (UPC) Codes (item numbers from products) and QR Codes from magazines or websites. Take an image with your web cam and bcWebCam will read the barcode. The barcode content will be copied into your browser or other application. Start bcWebCam, place the cursor in your application in the target field and hold the barcode in front of the camera. The barcode will be read automatically and the item number will be copied into the target field. You save the type job and avoid mistakes.

bcWebCam for EAN and QR Code is FREEWARE ( <http://www.bcwebcam.de/en> ).

There are low-priced editions available to read other linear barcodes and 2D Codes (Data Matrix and PDF417).

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Download a free evaluation copy of „QS-Barcode SDK “ or “QS-DocumentAssembler” for performing tests in detail from [http://www.qualitysoft.de/en/download\\_eval\\_form.htm](http://www.qualitysoft.de/en/download_eval_form.htm)

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Download our **freeware** barcode reader **bcTester** ( <http://www.bctester.de/en> ) and check whether your barcodes can be read with **QS-Barcode!**

Get the latest information on prices and what's available by visiting <http://www.qualitysoft.de>

### A Selection of Our Valued Customers

BancTec USA, Barclay Card International, Boss AG Bremen, Capital Bank Graz, Cendris UK, Credit Suisse, CSF Italy, DataChem Chemnitz, Demag Cranes & Components GmbH, Dicom Italy, Deutsche Post Direkt, elsag Solutions AG, Fraunhofer Inst. Magdeburg, Gerling Versicherungs-AG, Kyocera Mita, OBI Baumaerkte, Océ Deutschland, OneReason Switzerland, SER, Siemens, Softline Austria, T-Mobile Bonn, TechniSat, Thyssen-Krupp, Traussnig Spedition Austria, T-Systems, German Government Tax Offices