

# Variegator User Guide

## Enhanced QR Code



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## Using Enhanced QR Code

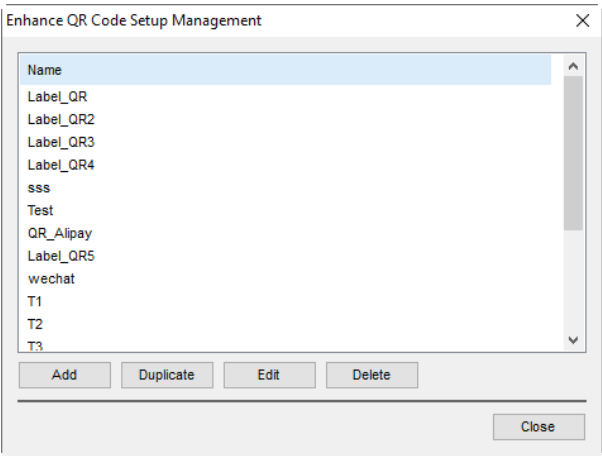
1. Draw a barcode box using the **Barcode** tool.
2. Assign the data column by going to the **FRAME** panel and select first the data type in **Source Type** menu and then the data source the in the **Frame Source** menu.
3. With the barcode box still selected, go to the **BARCODE** panel.

The screenshot shows the 'Barcode' panel with the 'Barcode' tab selected. The 'Type' dropdown is set to 'Enhanced QR Code' (callout 1). The 'Setup' dropdown is set to 'STD' (callout 2). The 'Scale' section has 'Fit in Barcode Box' selected, with 'proportionally' checked and 'H' and 'V' both set to 100% (callout 3). The 'Barcode text' checkbox is checked, and 'Justify' is unchecked. The 'Type' dropdown is set to 'Arial', 'Style' to 'Regular', 'Size' to '8', and 'Location' to 'Below'. The 'Format' field is empty. The 'Include Supplement' checkbox is unchecked. The 'Data source' dropdown is empty, and the 'Location' dropdown is set to 'Below'.

1	Enhanced QR Code Setup Management	Bring up the <b>Enhanced QR Code Setup Management</b> dialog when the <b>Type</b> menu is set to <b>Enhanced QR Code</b> for users to create enhanced QR code setups.
2	Edit QR Code Setup	Bring up the <b>Edit QR Code Setup</b> dialog for users to edit the currently selected enhanced QR Code setup.
3	QR Code Scale	Set the scaling of the enhanced QR code.

# Enhanced QR Code Setup Management

This is where users can create, edit and delete enhanced QR code setup. You will need a setup to specify the design of the QR code. Click the **Enhanced QR Code Setup Management** button in the **BARCODE** panel with the **Type** menu set to **Enhanced QR Code**.

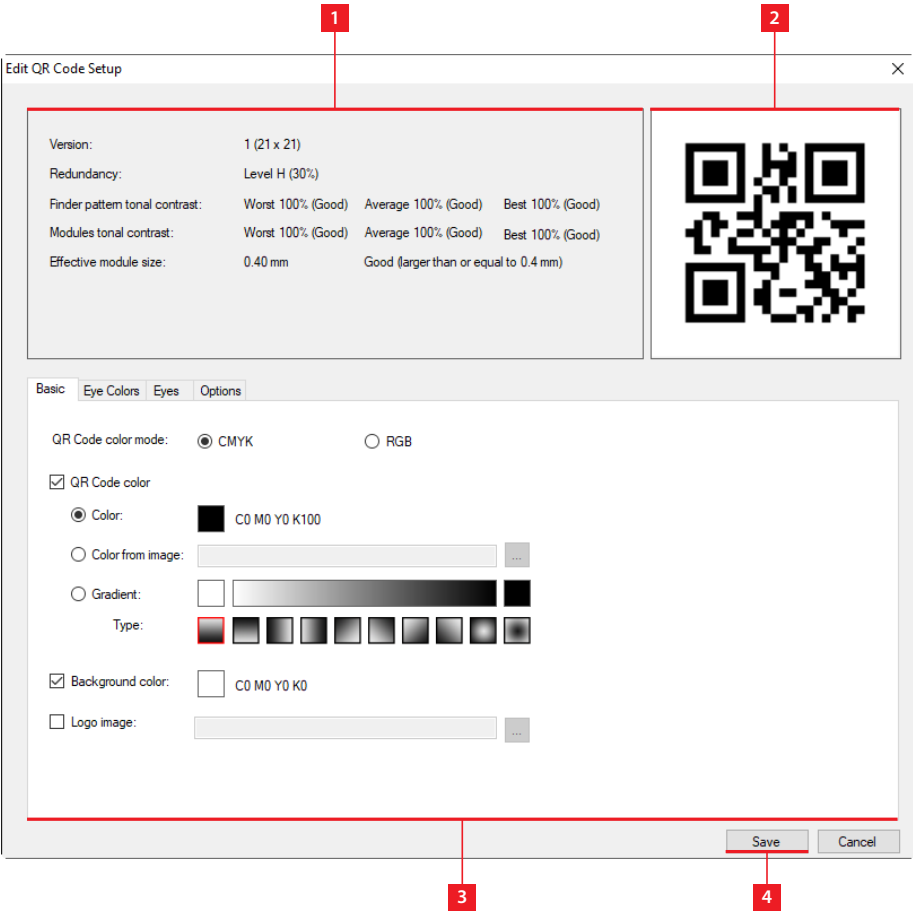


Add	Click <b>Add</b> to add an enhanced QR code setup.
Duplicate	Select an enhanced QR code setup and click the <b>Duplicate</b> button to add an enhanced QR code setup based one the selected enhanced QR code setup
Edit	Select an enhanced QR code setup and click the <b>Edit</b> button to edit the enhanced QR code setup
Delete	Select an enhanced QR code setup and click the <b>Delete</b> button to delete the enhanced QR code setup

When you add or edit a setup, the **Edit QR Code** dialog will be prompted.

# Edit QR Code

The **Edit QR Code Setup** dialog is for editing the design of an enhanced QR code. You can prompt the **Edit QR Code Setup** dialog by click **Add**, **Duplicate** or **Edit** in the **Enhanced QR Code Setup Management** dialog, or by click the **Edit QR Code Setup** button in the **BARCODE** panel.



The dialog is divided into 3 main parts.

1	Info	Display info about the QR code, including the size and the number of modules, redundancy level, etc.
2	Thumbnail	Display a thumbnail of the enhanced QR code based on the current design.
3	Setup	Configure the design of the enhanced QR code. This section is divided into 4 tab pages accessible by clicking the tabs on top.
4	Save	Click the <b>Save</b> button to save the setup. If this is a new setup, yo will be prompted for the name to save the setup.

## QR Code Info

The QR Code info is shown at the top-left corner of the **Edit QR Code Setup** dialog.

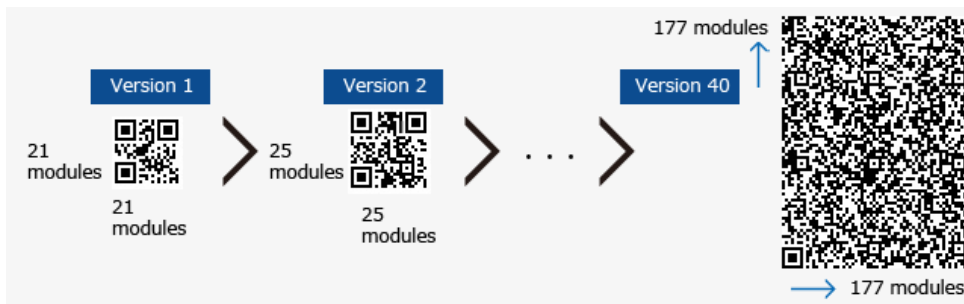
Version:	1 (21 x 21)		
Redundancy:	Level H (30%)		
Finder pattern tonal contrast:	Worst 100% (Good)	Average 100% (Good)	Best 100% (Good)
Modules tonal contrast:	Worst 100% (Good)	Average 100% (Good)	Best 100% (Good)
Effective module size:	0.40 mm	Good (larger than or equal to 0.4 mm)	

## Version

source: <https://www.qrcode.com/en/about/version.html>

The symbol versions of QR Code range from Version 1 to Version 40. Each version has a different module configuration or number of modules. (The module refers to the black and white dots that make up QR Code.)

"Module configuration" refers to the number of modules contained in a symbol, commencing with Version 1 (21 × 21 modules) up to Version 40 (177 × 177 modules). Each higher version number comprises 4 additional modules per side.



Each QR Code symbol version has the maximum data capacity according to the amount of data, character type and error correction level. In other words, as the amount of data increases, more modules are required to comprise QR Code, resulting in larger QR Code symbols.

## Redundancy

source: [https://www.qrcode.com/en/about/error\\_correction.html](https://www.qrcode.com/en/about/error_correction.html)

QR Code has error correction capability to restore data if the code is dirty or damaged. Four error correction levels are available for users to choose according to the operating environment. Raising this level improves error correction capability but also increases the amount of data QR Code size.

To select error correction level, various factors such as the operating environment and QR Code size need to be considered. Level Q or H may be selected for factory environment where QR Code get dirty, whereas Level L may be selected for clean environment with the large amount of data. Typically, Level M (15%) is most frequently selected.

QR Code Error Correction Capability*	
Level L	Approx 7%
Level M	Approx 15%
Level Q	Approx 25%
Level H	Approx 30%

## Finder Pattern Tonal Contrast

A QR code consists of finder patterns and modules. The finder patterns are the 3 square structure highlighted in Red in the diagram below. The rest of the dots are modules.

The finder pattern consists of three identical structures that are located in all corners of the QR Code except the bottom right corner. Each pattern is based on a 3x3 matrix of black modules surrounded by white modules that are again surrounded by black modules. The Finder Patterns enable the decoder software to recognize the QR Code and determine the correct orientation.



Tonal contrast is the difference between the tonal values for the 2 colors and in this case is the contrast between the finder or the module with the background. A higher tonal contrast makes a QR code easier to scan. A general guideline for tonal contrast -

**Good**    tonal contrast  $\geq 60\%$

**Pass**     $40 \leq \text{tonal contrast} < 60$

**Bad**     $40 < \text{tonal contrast}$

The worst, average and best tonal contrast values will be displayed. You should have an average which is above 60 and the worst should be above 40.

## Modules Tonal Contrast

The tonal contrast for modules is calculated the same way as Finder Pattern tonal contrast. The worst, average and best tonal contrast values will be displayed. You should have an average which is above 60 and the worst should be above 40.

## Effective Module Size

The effective module size as seen by a QR code scanner needs to be 0.4mm or above. If a module width is less than 0.4mm, the scanner may have problem reading the QR code.

Effective module size calculation depends on 3 factors - scanning distance, distance factor and data density factor.

### Scanning Distance

Scanning distance is the distance between the camera and the QR code when scanning the QR code.

### Distance Factor

The effective scanning distance is affected by the scanning condition and needs to be taken into account when calculating the effective module size. Factors affecting the scanning conditions include -

- poor lighting in the scan environment
- a mid-light colored QR code being used
- the scan not being done front on
- the eyes or modules are not the standard square shape

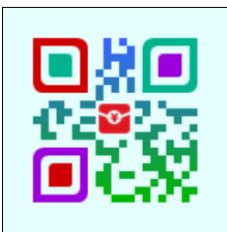
### Data Density Factor

The Data Density Factor depends on the QR code version which in turns affect the number of modules in the QR code. If there are 2 QR codes with the same size but one is a version 1 which has 21 modules across and the other is a version 10 with 57 modules across. The Version 10 one will have a much higher data density factor.

In the **Options** page, the user has to select how the QR code will be used (e.g. on screen only, in a magazine or in a poster) - this will affect the scanning distance and the distance factor and will affect the calculation of effective module size.

## Thumbnail

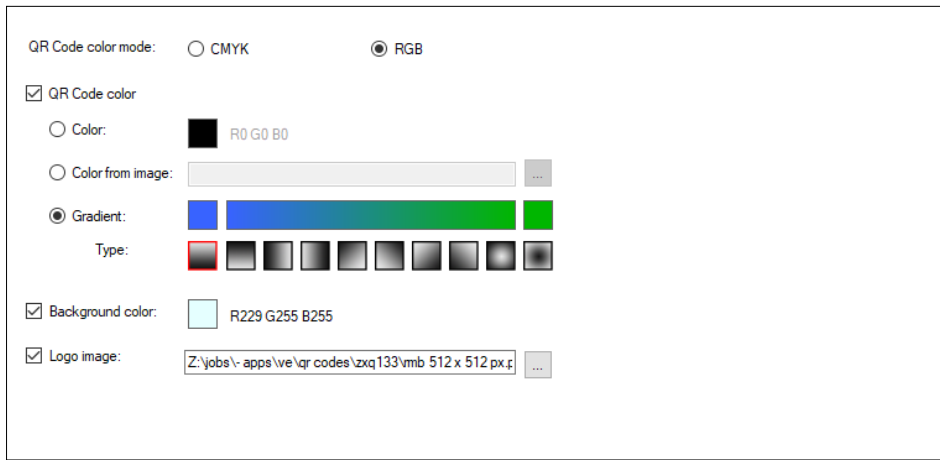
A thumbnail of the QR code based on the current design settings will be displayed at the top right corner.





## Basic Setup

The user can configure the basic color of the QR code in the **Basic** setup page.



The screenshot shows the 'Basic Setup' interface for QR code color configuration. It includes the following options:

- QR Code color mode:** Radio buttons for ☐ CMYK and ☒ RGB.
- QR Code color:** A checked checkbox with three sub-options:
  - ☐ **Color:** A black color patch followed by the text 'R0 G0 B0'.
  - ☐ **Color from image:** A text input field with a browse button ('...').
  - ☒ **Gradient:** A horizontal color gradient bar transitioning from blue to green, followed by a 'Type:' label and a row of eight grayscale gradient patches.
- Background color:** A checked checkbox with a light blue color patch followed by the text 'R229 G255 B255'.
- Logo image:** A checked checkbox with a text input field containing the path 'Z:\jobs\apps\qr codes\zxq133\mb 512 x 512 px.tif' and a browse button ('...').

## QR Code Color Mode

Select the color mode for the output file. This can be CMYK or RGB. This will also affect the output file format. If you select CMYK, you will be limited to generate PDF files. If you select RGB, you can generate PDF, PNG and JPG formats.

## QR Code Color

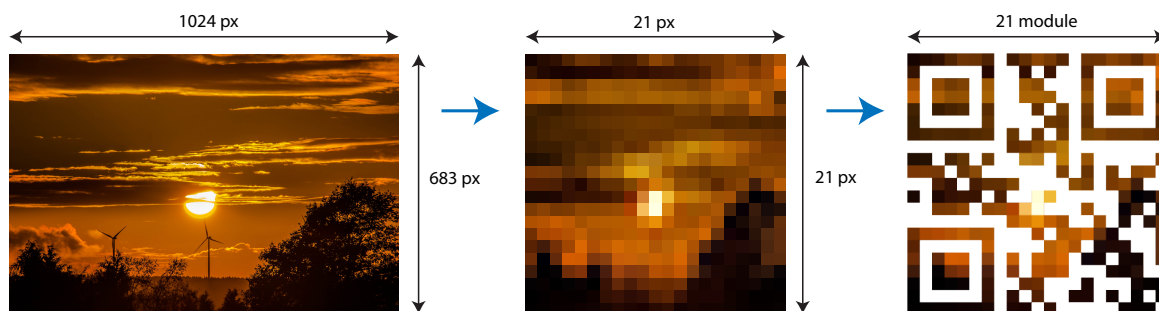
There are 3 ways to set the QR code color.

### Color

You can set a QR code to have flat color by selecting the Color option and click the patch to the right to select the color.

### Color From Image

You can set the QR code color using an image. You will need to select the image file to extract the color info.



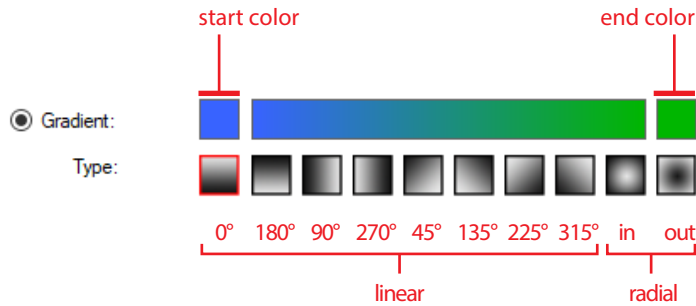
The original image can be square or rectangle.

The image will be subsampled so the final image size is equal to the number of modules for the qr code.

The color of the modules of the QR code is then looked up from the corresponding pixel in the subsampled image.

## Gradient

You can set the QR code color using a gradient.



1. Click on the **start color** patch to set the start color of the gradient.
2. Click on the **end color** patch to set the end color of the gradient.
3. Click on the **type** to select the gradient type. Both linear and radial gradients are supported.

## Background Color

Check the Background Color checkbox and enter the background color by clicking the patch to the right to set the background color for the QR code. If you leave this unchecked, the background is assumed to be transparent. You can then set the background color by setting the fill color of the QR code.

## Logo Image

You can insert a logo image in the center of the QR code.

The size of the logo image is calculated automatically to ensure there is at least 7% redundancy left. Since Level L only has 7% redundancy, it is not possible to add a logo image if the redundancy is set to Level L.

The following table shows the maximum number of modules that a square logo can occupy for different versions of QR code at different redundancy levels.

Version	Module Across	Data Modules	Level	Rect Area (Module <sup>2</sup> )	Rect Width (Module)
1	21	208	H	$208 \times 0.23 = 47$	6
2	25	359	H	$359 \times 0.23 = 82$	9
3	29	567	H	$567 \times 0.23 = 130$	11
4	33	807	H	$807 \times 0.23 = 185$	13
5	37	1079	H	$1079 \times 0.23 = 248$	15
6	41	1383	H	$1383 \times 0.23 = 318$	17
7	45	1568	H	$1568 \times 0.23 = 360$	18
8	49	1936	M	$1936 \times 0.08 = 154$	12
8	49	1936	Q	$1936 \times 0.18 = 348$	18
8	49	1936	H	$1936 \times 0.23 = 445$	21
16	81	5867	H	$5867 \times 0.23 = 1349$	36

## Eye Colors

The user can customize the colors of the 3 “eyes” in the finder pattern.

☒ Override base color

☐ All:

☒ Individual:

		C0 M0 Y0 K0			C0 M0 Y0 K0
		C211 M30 Y30 K0			C40 M139 Y139 K0
		C40 M139 Y139 K0			C122 M145 Y145 K0
		C122 M145 Y145 K0			C211 M30 Y30 K0

### Override base color

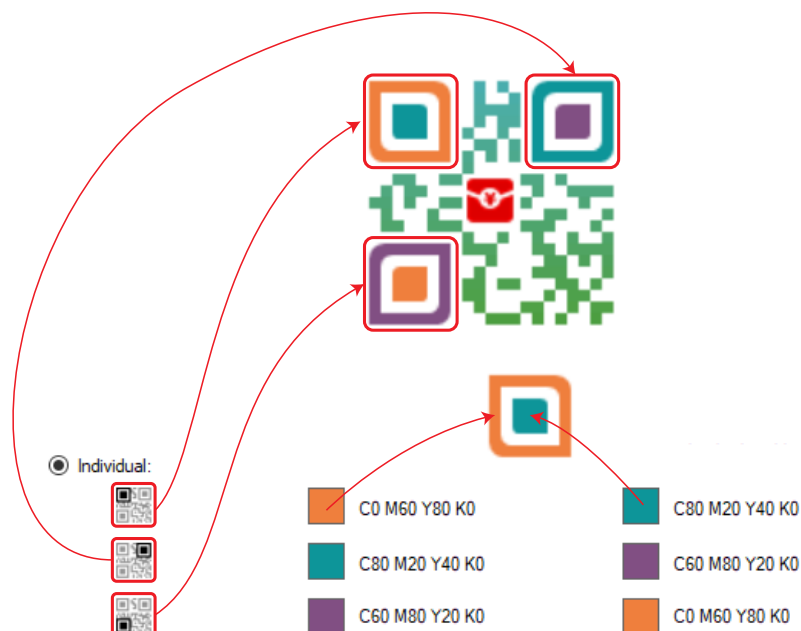
By default the finder pattern will be set to the QR code color. to set different colors for the finder pattern, check the checkbox **Override base color**.

#### All

You can set the inside and outside colors of all 3 “eyes” in the finder pattern by selecting the **All** option. You can then click the first patch to set the outside color, then the second patch for the inside color.

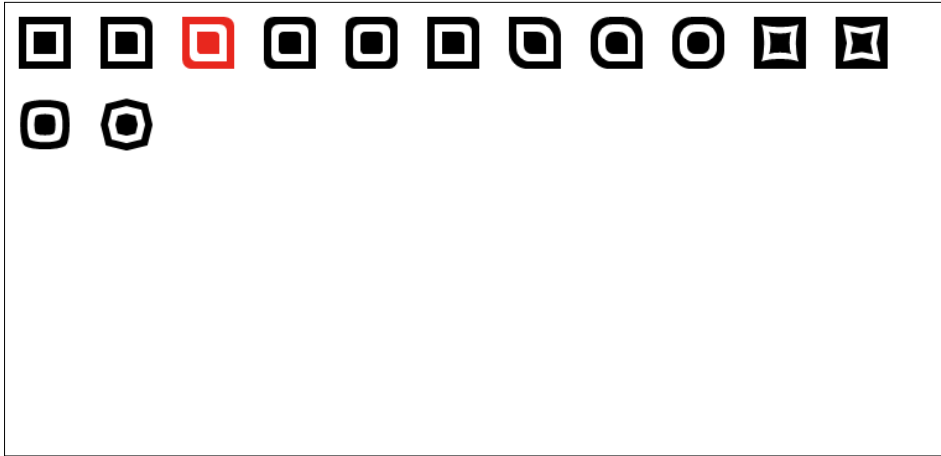
#### Individual

You can set the inside and outside colors for each “eye” in the finder pattern by selecting the **Individual** option.



## Eyes

You can change the shape of the eyes by clicking on the shape you want to use.



You can choose among 13 different shapes. Currently it is not possible for the user to add new shapes.



## Options

<b>Configuration</b>			
Encoding:	Automatic		
Redundancy level:	Level H (30%)		
Quiet zone:	4		
<b>Output Setup</b>			
Output type:	PDF	Suggested QR code Size for	Custom
Output size:	52.50 mm	Minimum QR code size:	52.50 mm

### Configuration

#### Encoding

You are advised to keep this setting as **Automatic** unless your data contains 2-byte characters such as Chinese or Japanese in which case you need to choose the encoding according to the text data encoding. Available encodings are -

- UTF-8
- UTF-16BE
- GB2312
- GBK
- GB18030
- Big5
- Shift\_JIS

#### Redundancy Level

Select the redundancy level according to your requirement. Please note that if you are inserting a logo image into the QR code, the available redundancy is reduced but is always just above or equal to 7%. Available redundancy levels are -

- Level L (7%)
- Level M (15%)
- Level Q (25%)
- Level H (30%)

#### Quiet Zone

Enter the size of the quiet zone. The unit is number of modules.

## Output Setup

### Output Type

Select the internal output type for the QR code. This is not the final output format. This is the internal QR code output format.

If the QR code color mode set in the Basic page is CMYK, the only option available here is PDF.

If the QR code color mode set in the Basic page is RGB, the options available here are PDF, JPG and PNG.

If you choose to output PDF, the QR code is drawn as a vector file.

If you choose to output JPG or PNG, the QR code is drawn as an image file.

### Suggested QR code size for

Select the intended usage for the QR code. This will set the approximated scanning distance and this will be used to calculate the effective module size.

The options are the scanning distance are listed in the table below.

Option	Scanning Distance (cm)	Scanning Distance (in)
On Screen	15 cm	6 in
Magazine	25 cm	10 in
Custom	50 cm	20 in
Poster	100 cm	40 in

### Output Size

This will display the calculated output size based on the selected option in the **Suggested QR Code Size For** menu, the data and the redundancy level.

You can also enter a value if the QR code needs to be a specific size.

### Minimum QR Code Size

This is the calculated minimum QR code size for the QR code to be scanned correctly.