



	<u>Veritec VeriCode</u>	<u>Veritec VS Code</u>	<u>QR Code</u>	<u>Notations</u>
Decoding Speed	Highest	Highest	No	# 1
Easily Shaped to fit area	No	Yes	No	# 2
EDAC Levels	2	Variable	4	# 6
Most Efficient for Small Data Size	Yes	No	No	# 3
Most Efficient for Large Data Size	No	Yes	No	# 3
Largest Size	48 x 48	192 x 192	177 x 177	# 4
Optimized R-S Correction	Yes	Yes	No	# 5
Most Efficient Use of Area	1st	2nd	3rd	# 6
Byte Capacity	174	4,151	2,953	# 4
Proven Biometric Capability	No	Yes	?	# 4
High Security	Yes	Yes	No	# 7
Proprietary License	Yes	Yes	No	# 7

Notations:

#1 The Reading Speed: VeriCode and VS Code has the solid outline around the symbol - This makes it faster and easier to find and decode. Decoding depends on the symbol size, and the processing. The name of QR Code comes from “Quick Response”. QR Code has characteristic “Position Detection Patterns (PDP)”. Its pattern is very convenient for hardware to detect the symbol position. So if the decoder HARDWARE detected these PDP’s, the decoding speed could be very fast. But in reality, we cannot utilize this benefit of PDP of QR Code. In most actual cases, the hardware simply captures the image and the software, running on CPU, process the captured image. 2D code decoders have to decode many kinds (continued on back)

of 2D code symbols. Do they mount special hardware that can be used only for QR Code?

When we use PC to decode the 2D code symbol, using (for example) USB camera hardware only to capture the image, we have to do all the image-process by software. And the pattern of PDP is not suitable for software. It takes long time for software to find out PDP's.

On the other hand, VeriCode and VS Code symbols are surrounded by four solid lines. This enclosure is very helpful for software to detect the symbol. As a result, VeriCode and VS Code enable the effective decoding program.

#2 Shape to fit area: The VS Code symbol can easily be made rectangular. Thus it can be made to fit a rectangular card more easily, and better utilize the rectangular shape of common image sensors.

#3 Efficient for size - data is denser: QR Code has three large “Locator Patterns” that reduce the usable area of the symbol. (These were designed for Laser Scanning, and are not required for Image Sensor technology.) VeriCode is “Pure Data” – VS Code and QR Code both use a Control Data as well as Message (User and R-S Redundancy) Data.

#4 Capacity: VS Code has larger capacity than QR Code (18% more)- Max capacity (binary data).
QR Code: 2953 bytes, 177x177 cells
VS Code: 4451 bytes, 192x192 cells

But more important is the fact that for a given size and resolution (and EDAC) more data can be decoded from the VS Code symbol (because more of the symbol area is used for data.)

#5 Optimized R-S Correction: Reed-Solomon character is 9-bits, packed into a 3x3 block. This is most efficient. Also because of the ‘square’ shape of the R-S characters, error correction is non-directional (QR Code uses a 2x4 arrangement, so a flaw in the ‘x2’ direction will damage twice as many R-S characters).

#6 The EDAC is available: VS Code uses the symbol area more efficiently than QR Code.

QR Code has 4 levels of error-correction.

L: about 7%

M: about 15%

Q: about 25%

H: about 30%

When we use the M-level error correction for example, 15% area is assigned to redundancy for error-correction and we can use the remaining 85% area for our own user data and other control data. But generally, these data cannot occupy just 85%. So we have to add **meaningless padding data** to adjust the data size to 85%. This is waste of the 2D code symbol space.

On the other hand, VS Code, as its specification, assigns all the remaining area, except the user data and other control information, as its redundancy for the error-correction. So the concept of “some levels of error-correction” does not exist in VSCode. And there is **no padding data** in VS Code. VSCode in that a minimum level is specified, but if the required data is less then the left over cells are added to the R-S correction capability. Thus, the EDAC is continuously variable, not one of four fixed models as in QR Code (where any unused data space is wasted.)

#7 Veritec’s symbols are protected by patents. The QR Code is Public Domain.