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QR Code
(English Translation)

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1 Scope

This Standard specifies the coding, symbol structure and size characteristics, error correction rules, reference decoding algorithms, and symbol quality requirements of the Quick Response Matrix Code (QR Code, hereinafter referred to as QR code) symbols.

This Standard is applicable to automatic identification and data acquisition.

2 Normative References

The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. At the time of publication, the editions indicated are valid. All standards are subject to revision. The parties who are using this Standard shall explore the possibility of using the latest version of the following standards.

GB/T 1988-1998 Information Technology - 7-Bit Coded Character Set for

Information Interchange (eqv ISO/IEC 646.1991)

GB 2312-1980 Code of Chinese Graphic Character Set for Information

Interchange - Primary Set

GB/T 12905-2000 Bar Coding Terminology

GB 18030-2000 Information Technology - Chinese Ideograms Coded Character

Set for Information Interchange-Extension for the Basic Set

ISO/IEC 15424.1999 Information Technology - Automatic Identification and Data

Capture Techniques - Data Carrier / Symbology Identifiers

AIM International Technical Specification - Extended Channel Interpretations. Part

1. Identification Scheme and Protocol (Referred to as "AIM ECI Specification")

3 Definitions

For the purposes of this Standard, the following definitions apply.

3.1 Alignment pattern

A fixed reference pattern that is used to determine the position of the matrix symbol.

In the case of a certain degree of damage to the image, the decoding software can use it to synchronize the coordinate map of the image module.

3.2 Character count indicator

A bit sequence that indicates the length of the data string in a certain mode.

3.3 ECI designator

A 6-digit number that is used to identify a specific ECI task.

3.4 Encoding region

The area in the symbol that is not occupied by functional pattern and is used to encode data or error correction codewords.

3.5 Extended Channel Interpretation (ECI)

In some symbology, protocols that allow different interpretations of the output data stream and the default character set.

3.6 Format information

A functional pattern containing the error correction level used by the symbol and the mask pattern information, which is used to decode the remaining part of the encoding region.

4.1 Mathematical operators

The mathematical operators used in this Standard are defined as follows.

div. is the integer division operator;

4.2 Module positions

For ease of reference, module positions are defined by their row and column coordinates in the symbol, in the form (i, j) where i designates the row (counting from the top downwards) and j the column (counting from left to right) in which the module is located, with counting commencing at 0. Module (0, 0) is therefore located at the upper left corner of the symbol.

4.3 Byte notation

Byte contents are shown as hexadecimal values.

4.4 Version references

Symbol versions are referred to in the form Version V-E where V identifies the version number (1 ~ 40) and E indicates the error correction level (L, M, Q, H).

5 Symbol Description

QR Code is a matrix symbology, which has independent positioning function and automatic identification capability. It also has the following characteristics.

5.3 Symbol structure

Each QR Code symbol shall be constructed of nominally square modules set out in a regular square array and shall consist of an encoding region and function patterns, namely finder patterns, separator, timing patterns, and alignment patterns.

5.3.3 Separators

A one-module wide Separator is placed between each Position Detection Pattern and Encoding Region, as illustrated in Figure 2, and is constructed of all light modules.

5.3.4 Timing Pattern

The horizontal and vertical Timing Patterns respectively consist of a one module wide row or column of alternating dark and light modules, commencing and ending with a dark module (as illustrated in Figure 2). The horizontal Timing Pattern runs across row

6 of the symbol between the separators for the upper Position Detection Patterns; the vertical Timing Pattern similarly runs down column 6 of the symbol between the separators

for the left-hand Position Detection Patterns. They enable the symbol density and version to be determined and provide datum positions for determining module coordinates.

5.3.5 Alignment Patterns

Each Alignment Pattern may be viewed as three superimposed concentric squares and is constructed of 5 x 5 dark modules, 3 x 3 light modules and a single central dark module (as illustrated in Figure 2). The number of Alignment Patterns depends on the symbol version and all symbols of Version 2 above (including Version 2) have the alignment patterns, see Annex E in detail.

5.3.6 Encoding region

This region shall contain the symbol characters representing data codeword, those representing error correction codewords, the Version Information and Format

Information. Refer to 6.7.1 for details of the symbol characters. Refer to 6.9 for details of the Format Information. Refer to 6.10 for details of the Version Information

5.3.7 Quiet zone

The quiet zone is a 4 module-wide zone surrounding the symbol, its nominal reflectance value shall be equal to that of the light modules.

6.2 Data analysis

Analyze the input data string to determine its content and select the default or other appropriate ECI and the appropriate mode to encode each sequence as described in

6.3 Modes

The modes defined below are based on the character values and assignments associated with the default ECI. When any other ECI is in force, the byte values rather than the specific character assignments shall be used to select the optimum data compaction mode. For example, Numeric Mode would be appropriate if there is a sequence of data byte values within the range 30HEX to 39HEX inclusive. In this case the compaction is carried out using the default numeric or alphabetic equivalents of the byte values.

6.3.1 Extended Channel Interpretation (ECI) Mode

The Extended Channel Interpretation (ECI) protocol allows the output data stream to have interpretations different from that of the default character set. The ECI protocol is defined consistently across a number of symbologies. Four broad types of interpretation are supported in QR Code.