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Information technology — Automatic identification and data capture techniques — Han Xin Code bar code symbology specification

Technologies de l'information — Techniques d'identification et de capture de données automatiques — Spécification des symboles du code à barres de Han Xin

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC XXXXX was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

Introduction

Han Xin Code is a two-dimensional matrix symbology which is made up of an array of nominally square modules arranged in an overall square pattern, including a Finder Pattern located at four corners of the symbol that are intended to assist in easy locating of its position, size and inclination. Alignment Patterns and Assistant Alignment Patterns are also used in Versions 4 to 84 symbols. A wide range of size of symbols is provided together with four error correction levels. Module dimension is user-specified to produce symbols by a wide variety of techniques.

Manufacturers of bar code equipment and users of the technology require publicly available standard symbology specifications to which they can refer when developing equipment and application standards. The publication of symbology specifications is designed to achieve this.

Information technology — Automatic identification and data capture techniques — Han Xin Code bar code symbology specification

1 Scope

This International Standard defines the requirements for the symbology known as Han Xin Code. It specifies the Han Xin Code symbology characteristics, data encoding process, symbol structure, dimensions and print quality requirements, error correction rules, reference decoding algorithm, and user-selectable application parameters.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 646, Information technology — ISO 7-bit coded character set for information interchange

ISO/IEC 19762, Information technology, Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary

ISO/IEC 15415, Information Technology — Automatic identification and data capture technique — Bar code print quality test specification — Two-dimensional symbols

ISO/IEC 15416, Information technology, Automatic identification and data capture techniques - Bar code print quality test specification - Linear symbols

ISO/IEC 15424, Information technology, Automatic identification and data capture techniques -- Data Carrier Identifiers (including Symbology Identifiers)

GS1 General Specifications

3 Terms and definitions, mathematical and logical symbols, abbreviations

3.1 Terms and Definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762 and the following apply.

3.1.1

Assistant Alignment Pattern

A non-data pattern located in the perimeter of the Han Xin Code symbol and intended to provide additional reference points to synchronize modules for reading.

3.1.2

data bit stream

A binary sequence comprised by the information bit stream and the error correction bit stream.

3.1.3

data codeword

Codewords that are used to encode information codewords and error correction codewords.

3.1.4

error correction bit stream

A binary sequence used to correct errors, made by error correction encoding from the information bit stream.

3.1.5

GS1 mode

Encoding mode used to representing GS1 data in Han Xin Code.

3.1.6

URI mode

Encoding mode used to representing Uniform Resource Identifier (URI) described in RFC 3986 in Han Xin Code.

3.1.7
Unicode mode

Encoding mode used to representing text data in Unicode (UTF8) encoding/charset in Han Xin Code.

3.1.8
information bit stream

A binary sequence made up of mode encodings from the original input data.

3.1.9
masking

XOR processing of the bit pattern in the information encoding region of the symbol with an algorithmically determined pattern to provide a symbol with more evenly balanced numbers of dark and light modules and reduced the occurrence of patterns which would interfere with fast processing of the image.

3.1.10
mode

Method of representing a specific character set as a binary bit stream.

3.1.11
mode indicator

The bit sequence indicating in which mode the following data sequence is encoded.

3.1.12
mode terminator

A bit sequence used to terminate the bit sequence representing an encoding mode.

3.1.13
padding bit

Bit ”0”, appended to the information bit stream to meet the requirements of the error correction algorithm.

3.1.14

Position Detection Pattern

One of the four pattern components of the Finder Pattern in Han Xin Code symbols.

3.1.15

Position Detection Center

The center of the 3×3 dark modules in the Position Detection Pattern.

3.1.16

Position Detection Pattern Separator

A one module wide non-data pattern, made up of all light modules, used to separate the Position Detection Pattern from the Structural Information region.

3.1.17

Structural Information

A bit stream of data used to record version, error correction level and masking solution.

3.1.18

symbol padding bit

Bit ”0”, not representing data, used to fill the empty positions of the symbol when the information encoding region cannot be fully filled with 8-bit codewords.

3.1.19

version

Size of the symbol represented in terms of its position in the sequence of permissible sizes for Han Xin Code symbols, from 23 × 23 modules (Version 1) to 189 × 189 modules (Version 84).

3.2 Mathematical and logical symbols

For the purposes of this specification, the mathematical symbols which follow shall apply globally unless defined locally:

d number of error correction codewords

e number of erasures

k total number of information codewords

n total number of data codewords

t number of errors

X horizontal width of a module

Y vertical distance from the center line of modules in one row to the center line of modules in an adjacent row

$(\ldots)_{bin}$ data in ( ) is figured in binary system.

…HEX data is figured in hexadecimal.

$(\ldots)_{hex}$ data in ( ) is figured in hexadecimal.

Without any specific statement, a byte is usually comprised of 8 binary bits and the byte's contents are represented in hexadecimal.

For the purposes of this specification, the mathematical operations which follow shall apply:

div is the integer division operator.

mod is the integer remainder after division.

XOR is the exclusive-or logic function whose output is one only when its two inputs are not equivalent.

3.3 Abbreviations

ECI Extended Channel Interpretation

4 Symbology Description

4.1 Symbology Characteristics

4.1.1 Basic Characteristics

Han Xin Code is a two-dimensional matrix symbology with the following basic characteristics:

4.1.1.1 Encodable characters:

(1) Numeric characters (digits 0～9)

(2) ASCII characters (reference to ISO/IEC 646)

(3) Chinese characters (reference to GB18030)

(4) Octet bytes such as graphic and audio information, etc.

(5) GS1 data used in GS1 system

(6) Uniform Resource Identifier (URI)

(7) Any text data reference to a encoding/charset (such as Unicode, JIS, …)

4.1.1.2 Representation of data:

A dark module is a binary one and a light module is a zero, Howerver, dark module is zero and a light module is one for the reflectance reversal symbols. See 4.1.2 for details of reflectance reversal.

4.1.1.3 Symbol size in modules:

23 modules × 23 modules to 189 modules × 189 modules (Version 1 to 84, increasing in steps of two modules per side)

4.1.1.4 Maximum data capacity:

(1) Numeric data: 7827 characters

(2) ASCII characters: 4350 characters

(3) Common Chinese Characters in Regions One and Two of GB18030: 2174 characters

(4) 2-byte Chinese characters data: 1739 characters

(5) 4-byte Chinese characters data: 1044 characters

(6) Binary byte data: 3261 bytes

4.1.1.5 Selectable error correction:

Four levels of Reed-Solomon error correction and their error correction abilities of symbol codewords are shown as follows:

L1	8%
L2	15%
L3	23%
L4	30%

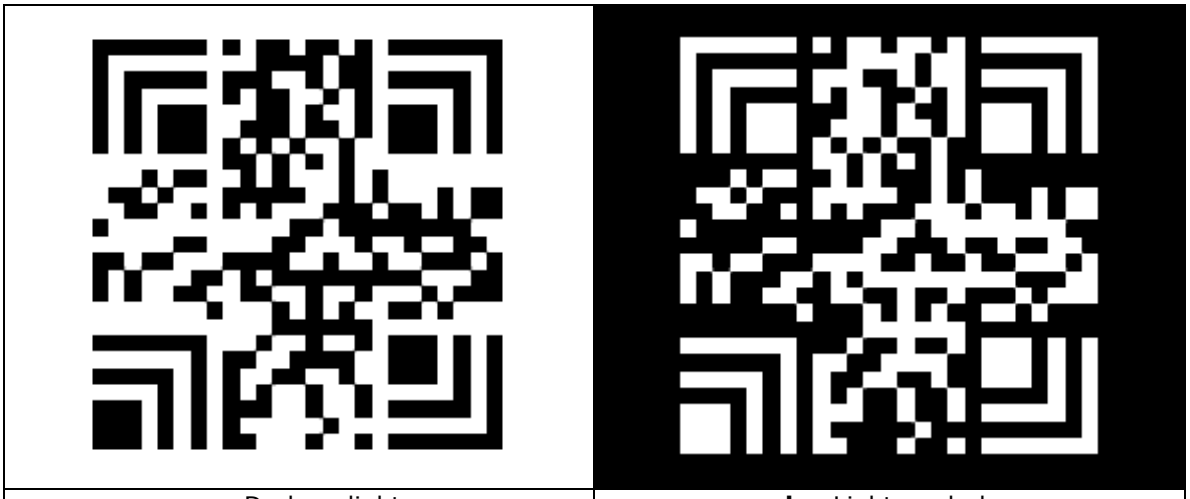
4.1.2 Summary of Additional Features

The following summarize additional inherent and optional features of Han Xin Code:

a. Masking: (Inherent) Masking pattern is used to the proportions of dark modules and light modules in the symbols and decrease the occurrences of images preventing fast processing.

b. Reflectance reversal: (Inherent) Symbols are intended to be read when marked so that the image is either dark on light or light on dark (see Figure 1).

c. Extended Channel Interpretations: (Optional) This mechanism enables characters from other character sets (e.g. Arabic, Cyrillic, Greek, Hebrew) and other data interpretations or industry-specific requirements to be represented.



a. Dark on light | **b.** Light on dark

Figure 1: Examples of Hanxin Code symbol encoding the text ”Han Xin Code Symbol”

4.2 Symbol Structure

Each Han Xin Code symbol shall be constructed of n × n nominally square modules set out in a regular square array and shall consist of an information encoding region, Structural Information regions and Fixed Pattern region. Fixed Pattern region include Finder Pattern, Position Detection Pattern separators, Alignment Pattern and Assistant Alignment Patterns. The symbol shall be surrounded by a quiet zone. Figure 2 illustrates a Version 24 Han Xin Code symbol. Figure 3 illustrates the structure of a Version 24 symbol.

Figure 2: Han Xin Code symbol (Version 24)

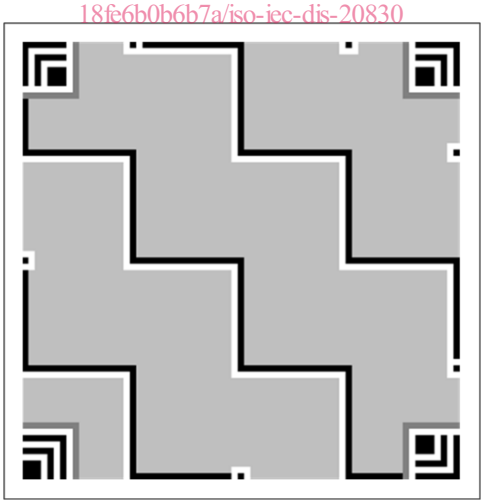


Figure 3: Structure of a Version 24 Han Xin Code symbol

4.2.1 Symbol Versions and Sizes

There are eighty-four sizes of Han Xin Code symbol referred to as Version 1, Version 2 … Version 84 respectively. Version 1 measures 23 modules × 23 modules, Version 2 measures 25 modules × 25