
**Information technology — Automatic
identification and data capture
techniques — MicroPDF417 bar code
symbology specification**

*Technologies de l'information — Techniques d'identification
automatique et de capture des données — Spécifications pour la
symbologie de code à barres MicroPDF417*

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2006

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols, operations and abbreviated terms	4
4.1 Symbols	4
4.2 Mathematical operations.....	5
4.3 Abbreviated terms	5
5 Requirements	5
5.1 Symbology characteristics	5
5.1.1 Basic characteristics	5
5.1.2 Summary of additional features	6
5.2 Symbol structure	7
5.2.1 MicroPDF417 symbol parameters.....	7
5.2.2 Row and column combinations.....	9
5.2.3 Row parameters	10
5.2.4 Codeword sequence.....	10
5.2.5 MicroPDF417 Row Address Patterns.....	12
5.3 Basic encodation	14
5.3.1 Symbol character structure	14
5.3.2 Start and Stop Patterns	15
5.4 High level (data) encodation.....	15
5.4.1 Function codewords.....	15
5.4.2 Text Compaction mode	21
5.4.3 Byte Compaction mode.....	25
5.4.4 Numeric Compaction mode	27
5.4.5 Advice to select the appropriate compaction mode	28
5.4.6 Treatment of MicroPDF417 reserved codewords	29
5.5 Extended Channel Interpretation	29
5.5.1 Encoding the ECI assignment number.....	30
5.5.2 Pre-assigned and default Extended Channel Interpretations	31
5.5.3 Encoding ECI sequences within compaction modes	31
5.5.4 Post-decode protocol	33
5.6 Determining the codeword sequence.....	33
5.7 Error detection and correction	34
5.7.1 Number of error correction codewords.....	34
5.7.2 Error correction capacity	34
5.7.3 Defining the error correction codewords	35
5.8 Dimensions.....	35
5.8.1 Minimum width of a module (X).....	35
5.8.2 Row height (Y).....	35
5.8.3 Quiet zones.....	35
5.9 Defining the symbol format	35
5.9.1 Defining the aspect ratio of the module	36
5.9.2 Defining the symbol matrix of rows and columns	36
5.10 Generating the error correction codewords	37
5.11 Low level encodation	39
5.11.1 Clusters.....	40

5.11.2	Determining the symbol matrix	40
5.11.3	Determining the values of the Row Address Patterns	40
5.11.4	Row encoding.....	46
5.12	Printing Row Address Patterns	46
5.13	Structured Append.....	47
5.13.1	Compaction modes and Structured Append.....	47
5.13.2	ECIs and Structured Append	47
5.14	User guidelines	47
5.14.1	Human readable interpretation.....	47
5.14.2	Autodiscrimination capability.....	47
5.14.3	User-defined application parameters.....	48
5.14.4	MicroPDF417 symbol quality	48
5.14.5	Separation of multiple symbols.....	49
5.15	Reference decode algorithm.....	49
5.16	Error detection and error correction procedure	49
5.17	Transmitted data	49
5.17.1	Transmitted data in the basic (default) interpretation.....	49
5.17.2	Transmission protocol for Extended Channel Interpretation (ECI)	49
5.17.3	Transmitted data for Structured Append.....	51
5.17.4	Transmission of reserved codewords using the ECI protocol.....	51
5.17.5	Symbology identifier.....	51
5.17.6	Transmission using older protocols	51
Annex A (normative)	Encoding/decoding table of PDF417 symbol character bar-space sequences.....	52
Annex B (normative)	The default character set for Byte Compaction mode	67
Annex C (normative)	Byte Compaction mode encoding algorithm	68
Annex D (normative)	Numeric Compaction mode encoding algorithm.....	70
Annex E (normative)	Error correction	72
Annex F (normative)	Tables of coefficients for calculating MicroPDF417 error correction codewords	73
Annex G (normative)	Text Compaction mode encoding algorithm.....	77
Annex H (normative)	Structured Append MicroPDF417 symbols	78
H.1	Structured Append overview	78
H.2	Structured Append syntax	78
H.3	High level encoding considerations	81
H.4	Encodation example	81
H.5	Structured Append and the Extended Channel Interpretation protocol	82
H.6	Structured Append data transmission.....	83
Annex I (normative)	Testing MicroPDF417 symbol quality.....	86
I.1	Overview of methodology	86
I.2	Test scans for scan reflectance profile	86
Annex J (normative)	Reference decode algorithm for MicroPDF417.....	88
J.1	Phase 1: Initialization.....	88
J.2	Phase 2: Filling the matrix.....	89
J.3	Phase 3: Interpretation	90
J.4	Reference line-decode algorithm	91
Annex K (normative)	Error correction procedures	95
Annex L (normative)	Symbology identifier	97
Annex M (normative)	Transmission protocol for decoders conforming with original PDF417 standards.....	98
M.1	Basic Channel Mode	98
M.2	GLI encoded symbols.....	98
M.3	Structured Append symbols.....	100
M.4	Transmission of reserved codewords using the original PDF417 protocol	101

M.5	Achieving compatibility between old and new PDF417 equipment	101
Annex N (informative)	Algorithm to minimise the number of codewords	104
Annex O (informative)	Guidelines to determine the symbol matrix	106
Annex P (informative)	Calculating the coefficients for generating the error correction codewords — worked example	107
Annex Q (informative)	Generating the error correction codewords — worked example	109
Annex R (informative)	Division circuit procedure for generating error correction codewords	112
Annex S (informative)	Additional guidelines for the use of MicroPDF417	113
S.1	Autodiscrimination compatibility	113
S.2	Pixel-based printing	113
Bibliography		115

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national 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 and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 24728 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic Identification and data capture techniques*.

This International Standard contains many provisions which are identical with those of ISO/IEC 15438.

Introduction

MicroPDF417 is a multi-row symbology, derived from and closely based on PDF417. MicroPDF417 is designed for applications with a need for improved area efficiency but without the requirement for PDF417's maximum data capacity. A limited set of symbol sizes is available, together with a fixed level of error correction for each symbol size. Module dimensions are user-specified to enable symbol production and reading by a wide variety of techniques.

Since MicroPDF417's data character encodation, its error correction method, and many of its other symbol characteristics are, and are intended to remain, identical to those of PDF417, descriptions of these characteristics are quoted verbatim from the PDF417 symbology specification (ISO/IEC 15438) wherever appropriate, or with the appropriate modifications. For ease of cross-reference, this International Standard follows a similar document structure, with minor differences in clause/subclause numbering, to ISO/IEC 15438.

Information technology — Automatic identification and data capture techniques — MicroPDF417 bar code symbology specification

1 Scope

This International Standard specifies the requirements for the bar code symbology known as MicroPDF417. It specifies the MicroPDF417 symbology characteristics, data character encodation, symbol formats, dimensions, error correction rules, decoding algorithm, and a number of 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 646:1991, *Information technology — ISO 7-bit coded character set for information interchange*

ISO/IEC 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

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

ISO/IEC 15417, *Information technology — Automatic identification and data capture techniques — Bar code symbology specification — Code 128*

ISO/IEC 15418, *Information technology — EAN/UCC Application Identifiers and Fact Data Identifiers and Maintenance*

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

ISO/IEC 24723, *Information technology — Automatic identification and data capture techniques — EAN.UCC Composite bar code symbology specification*

ISO/IEC 19762-1, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 1: General terms relating to AIDC*

ISO/IEC 19762-2, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 2: Optically readable media (ORM)*

AIM Inc. International Technical Standard: ITS/04-001, *Extended Channel Interpretations — Part 1: Identification Schemes and Protocols*¹

GS1 General Specification²

¹ Published by AIM Global, 125 Warrendale-Bayne Road, Suite 100, Warrendale, PA 15086, USA.

² Published by GS1, Blue Tower, Avenue Louise 326, bte 10, B-1050 Brussels, Belgium.