ISO/IEC 18004:2015-02 (E)

Information technology - Automatic identification and data capture techniques - QR Code bar code symbology specification

Contents

Page

Foreword vi

Introduction vii

1 Scope 1

2 Conformance 1

3 Normative references 1

4 Terms and definitions 2

5 Mathematical and logical symbols, abbreviations and conventions 4
5.1 Mathematical and logical symbols 4
5.2 Abbreviations 4
5.3 Conventions 4
5.3.1 Module positions 4
5.3.2 Byte notation 4
5.3.3 Version references 4

6 Symbol description 4
6.1 Basic characteristics 4
6.2 Summary of additional features 6
6.3 Symbol structure 7
6.3.1 General 7
6.3.2 Symbol Versions and sizes 9
6.3.3 Finder pattern 16
6.3.4 Separator 17
6.3.5 Timing pattern 17
6.3.6 Alignment patterns 17
6.3.7 Encoding region 17
6.3.8 Quiet zone 17

7 Requirements 18
7.1 Encode procedure overview 18
7.2 Data analysis 20
7.3 Modes 20
7.3.1 General 20
7.3.2 Extended Channel Interpretation (ECI) mode 20
7.3.3 Numeric mode 21
7.3.4 Alphanumeric mode 21
7.3.5 Byte mode 21
7.3.6 Kanji mode 21
7.3.7 Mixing modes 21
7.3.8 Structured Append mode 21
7.3.9 FNC1 mode 22
7.4 Data encoding 22
7.4.1 Sequence of data 22
7.4.2 Extended Channel Interpretation (ECI) mode 23
7.4.3 Numeric mode 25
7.4.4 Alphanumeric mode 26

7.4.5 Byte mode 27
7.4.6 Kanji mode 29
7.4.7 Mixing modes 30
7.4.8 FNC1 modes 30
7.4.9 Terminator 32
7.4.10 Bit stream to codeword conversion 32
7.5 Error correction 36
7.5.1 Error correction capacity 36
7.5.2 Generating the error correction codewords 44
7.6 Constructing the final message codeword sequence 45
7.7 Codeword placement in matrix 46
7.7.1 Symbol character representation 46
7.7.2 Function pattern placement 46
7.7.3 Symbol character placement 46
7.8 Data masking 50
7.8.1 General 50
7.8.2 Data mask patterns 50
7.8.3 Evaluation of data masking results 53
7.9 Format information 55
7.9.1 QR Code symbols 55
7.9.2 Micro QR Code symbols 57
7.10 Version information 58

8 Structured Append 59
8.1 Basic principles 59
8.2 Symbol Sequence Indicator 60
8.3 Parity Data 61

9 Symbol printing and marking 61
9.1 Dimensions 61
9.2 Human-readable interpretation 61
9.3 Marking guidelines 61

10 Symbol quality 62
10.1 Methodology 62
10.2 Symbol quality parameters 62
10.2.1 Fixed pattern damage 62
10.2.2 Scan grade and overall symbol grade 62
10.2.3 Grid non-uniformity 62
10.3 Process control measurements 62

11 Decoding procedure overview 62

12 Reference decode algorithm for QR Code 63

13 Autodiscrimination capability 70

14 Transmitted data 70
14.1 General principles 70
14.2 Symbology Identifier 71
14.3 Extended Channel Interpretations 71
14.4 FNC1 72

Annex A (normative) Error detection and correction generator polynomials 73

Annex B (normative) Error correction decoding steps 77

Annex C (normative) Format information 79

Annex D (normative) Version information 81

Annex E (normative) Position of alignment patterns 83

Annex F (normative) Symbology Identifier 85

Annex G (normative) QR Code print quality .....

symbology-specific aspects 86

Annex H (informative) JIS8 and Shift JIS character sets 92

Annex I (informative) Symbol encoding examples 94

Annex J (informative) Optimisation of bit stream length 99

Annex K (informative) User guidelines for printing and scanning of QR Code symbols 108

Annex L (informative) Autodiscrimination 110

Annex M (informative) Process control techniques 111

Annex N (informative) Characteristics of Model 1 symbols 113

Bibliography 116