

ISO/IEC 29158:2020 (E)

Information technology — Automatic identification and data capture techniques — Direct Part Mark (DPM) Quality Guideline

Contents

	Foreword
	Introduction
1	Scope
2	Normative references
3	Terms and definitions
4	Symbols and abbreviated terms
5	Overview of methodology
5.1	Process differences from ISO/IEC 15415
5.2	Lighting
5.3	Tilted coaxial lighting and camera position (TCL)
6	Obtaining the image
6.1	Camera position and symbol orientation
6.1.1	Symbol placement
6.1.2	Camera position in a 90 ° camera angle set up
6.1.3	TCL setup
6.2	Lighting environments
6.2.1	General
6.2.2	Perpendicular coaxial (90)
6.2.3	Diffuse off-axis (D)
6.2.4	Four direction (angle Q)
6.2.5	Two direction (angle T)
6.2.6	One direction (angle S)
6.2.7	TCL Setup
6.3	Image focus
6.4	Depth of field
6.5	System response adjustment and reflectance calibration
7	Verifying a symbol
7.1	Initial image reflectance
7.1.1	General
7.1.2	Initialize aperture size
7.1.3	Create initial histogram
7.1.4	Compute mean
7.1.5	Optimize image
7.2	Obtaining the test image
7.2.1	Matrix symbologies
7.2.2	Binarize image
7.3	Apply Reference Decode Algorithm
7.3.1	General
7.3.2	Repeat if necessary
7.3.3	Continue until end
7.4	Final image adjustment
7.4.1	General
7.4.2	Determine grid-point reflectance with two apertures
7.4.3	Create a grid-point histogram
7.4.4	Measure mean light (ML)

- 7.4.5 Record parameters
- 7.4.6 Create binarized images for the symbology reference decode
- 7.4.7 Decode
- 8 Determine contrast parameters
 - 8.1 Initialize aperture size
 - 8.2 Calculate cell contrast (CC)
 - 8.3 Calculate cell module modulation (CMOD)
 - 8.4 Calculate minimum reflectance (Rtarget)
- 9 Grading
 - 9.1 Cell contrast (CC)
 - 9.2 Minimum reflectance (Rtarget)
 - 9.3 Cell modulation (CM)
 - 9.4 Fixed pattern damage (FPD)
 - 9.5 Final grade
- 10 Communicating grade requirements and results
 - 10.1 General
 - 10.2 Communication of application requirements
 - 10.3 Communicating from verifier to application
 - 10.4 Communicating the use of a proprietary decode
- Annex A (normative) Threshold determination method
 - A.1 Algorithm description
 - A.2 Example
- Annex B (informative) Evaluation of image at virtual 90° camera position from real tilted camera position
 - B.1 General
 - B.2 Algorithm
 - B.3 Evaluation of the point x' , y' on the camera image plane p
 - B.4 Evaluation of the value of the point x' , y' by linear interpolation
- Annex C (normative) Continuous grading for ISO/IEC 15415 parameters
 - C.1 General
 - C.2 Grades and mapping
 - C.3 Interpolation definition (AN, GN, UEC and Mod or MARGIN)
 - C.4 Mathematical formulas (AN, GN, UEC and MOD or MARGIN)
 - C.5 Modulation calculation procedure
 - C.6 Fixed Pattern Damage (FPD)
- Annex D (normative) Dot connecting algorithm
 - D.1 Initializing stick size and module colour
 - D.2 Connect like colours
 - D.3 Apply the reference decode algorithm
 - D.3.1 General
 - D.3.2 Find symbology reference lines
 - D.3.3 Transfer reference lines
 - D.4 Repeat if necessary
 - D.5 Continue until end
- Annex E (informative) Communicating the grade
 - E.1 General
 - E.2 Scanning environment examples
 - E.2.1 Category 0 part description
 - E.2.2 Category 1 part description
 - E.2.3 Category 2 part description
 - E.2.4 Category 3 part description
 - E.3 Grade communication examples
 - E.3.1 General
 - E.3.2 Grade requirement examples
 - E.3.2.1 Category 0 part requirement
 - E.3.2.2 Category 1 part requirement

- E.3.2.3 Category 2 part requirement
- E.3.2.4 Category 2 part requirement with TCL setup
- E.3.3 Grade reporting examples
- E.3.3.1 Category 0 part reporting (following ISO/IEC 15415)
- E.3.3.2 Category 1 part reporting
- E.3.3.3 Category 2 part reporting
- E.3.4 Application grade reporting
- E.3.4.1 General
- E.3.4.2 Category 0 part reporting
- E.3.4.3 Category 1 part reporting
- E.3.4.4 Category 2 part reporting

Annex F (informative) Cross reference to ISO/IEC 15415

Page count: 33