TAGA NextGen

The Relationship of 2D Barcode Size & its Ability to Decode

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Sunrise 2027

GS1 is advocating for the replacement
of 1D barcodes with 2D barcodes by 2027

Objective

Determine the optimal range of scannability and verification of 2D barcodes.

Specifications

- Konica Minolta Accurio C12000
- 80# silk cover
- Cognex DataMan Verifier

Process

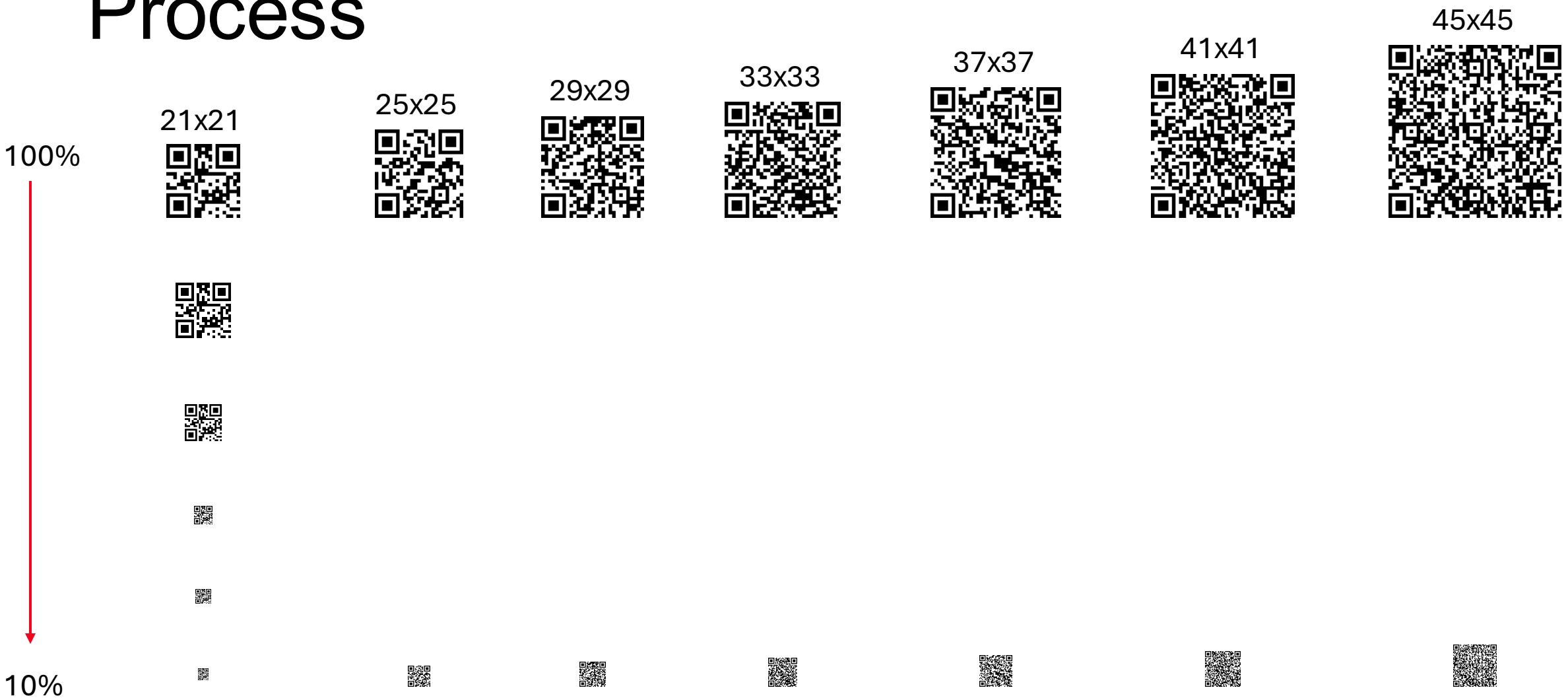
	21x21	25x25	29x29	33x33	37x37	41x41	45x45
H & W @100%	1.17”	1.39”	1.6”	1.83”	2.05”	2.28”	2.72”







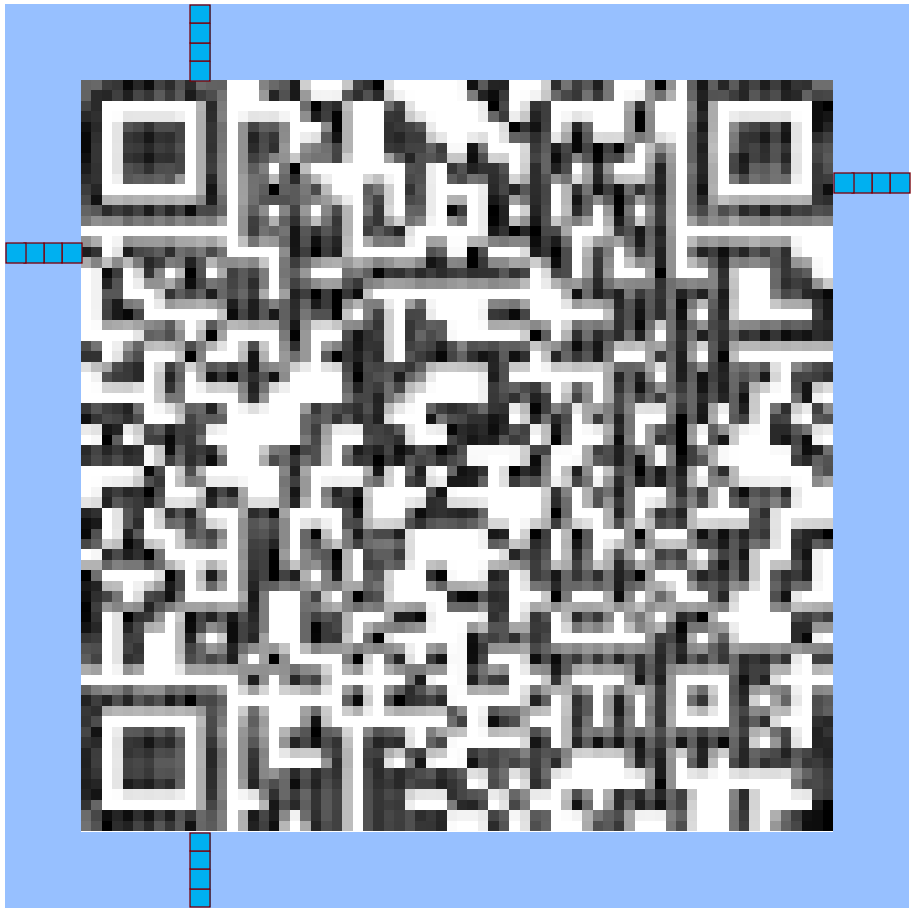
Process



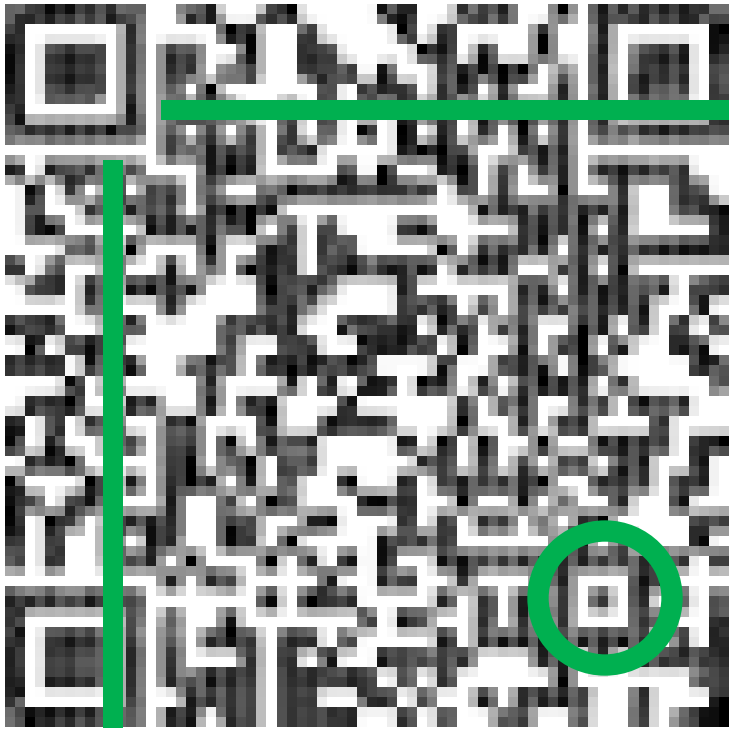
GS1 2D Barcode Standards

ISO/IEC 15415:2011E

Quiet Zone



Finder Pattern



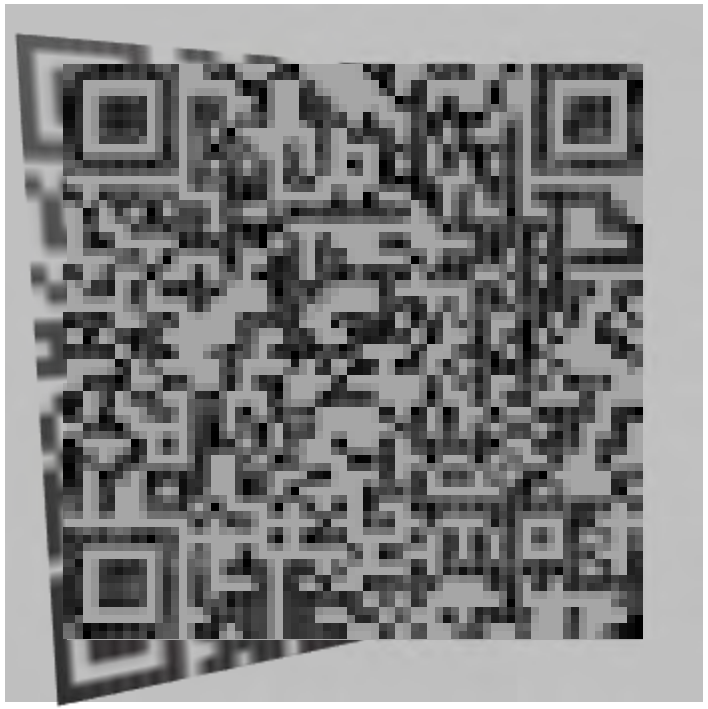
InDesign QR Code Generator

Object > Generate QR Code…

The required <FNC1> was not found

Quality Parameters

- Decode
- Symbol contrast
- Modulation
- Reflectance Margin
- Fixed pattern damage
- Axial non-uniformity
- Grid non-uniformity
- Unused error correction



COGNEX

DM8072V Verification Report

Unit Serial: 1A1825PP333813
Verified: Fri 21-Feb-2025 03:45 PM
Firmware Version: 5.7.10_sr2
Last Calibrated: Mon 10-Feb-2025 03:57 PM

Report Summary

Data	https://www.flexography.org/fta-membership/committees/flexo-quality-consortium-fqc/
Symbology	Direct Mark QR
Device Name	DM8072-6CC766

Verification Grades

Standard	Grade	Aperture	Wavelength	Lighting	Formal Grade
ISO 15415:2011	4.0 (A)	08	660	45	4.0/08/660/45
GS1	Fail (Data Format)				

GS1 system symbol specification table was ambiguous. Symbol matched the following tables: 7 11 Symbol evaluated using table 11.

Image

Symbol Characteristics

QR Size	37x37
Horizontal BWG	20%
Vertical BWG	21%
Encoded characters	83
Total Codewords	134
Data Codewords	86
Error Correction Budget	24
Errors Corrected	0
Error Capacity Used	0
Error Correction Level	M
Data Mask Pattern	2
Image	Black on white
Nominal X Dim	0.280 mm
Pixels per Module	13.08
ECI	000003

ISO 15415:2011 Quality Parameters

1. Unused Error Correction (UEC)	100%		A	PASS
2. Symbol Contrast (SC)	RB/Rd = 92/3	89%	A	PASS
3a. Modulation (MOD)			A	PASS
3b. Reflectance Margin (RM)			A	PASS
4. Axial Nonuniformity (ANU)		0.8%	A	PASS
5. Grid Nonuniformity (GNU)		0.0%	A	PASS
6. Fixed Pattern Damage (FPD)			A	PASS
7. Upper Left Pattern (ULP)			A	PASS
8. Upper Right Pattern (URP)			A	PASS
9. Lower Left Pattern (LLP)			A	PASS
10. Horizontal Clock Track (HCT)			A	PASS
11. Vertical Clock Track (VCT)			A	PASS
12. Alignment Pattern (ALP)			A	PASS
13. Version Information Block (VIB)				
14. Format Information Block (FIB)			A	PASS
15. DECODE			A	PASS

Data Format Check

GS1 Application Data Format: FNC

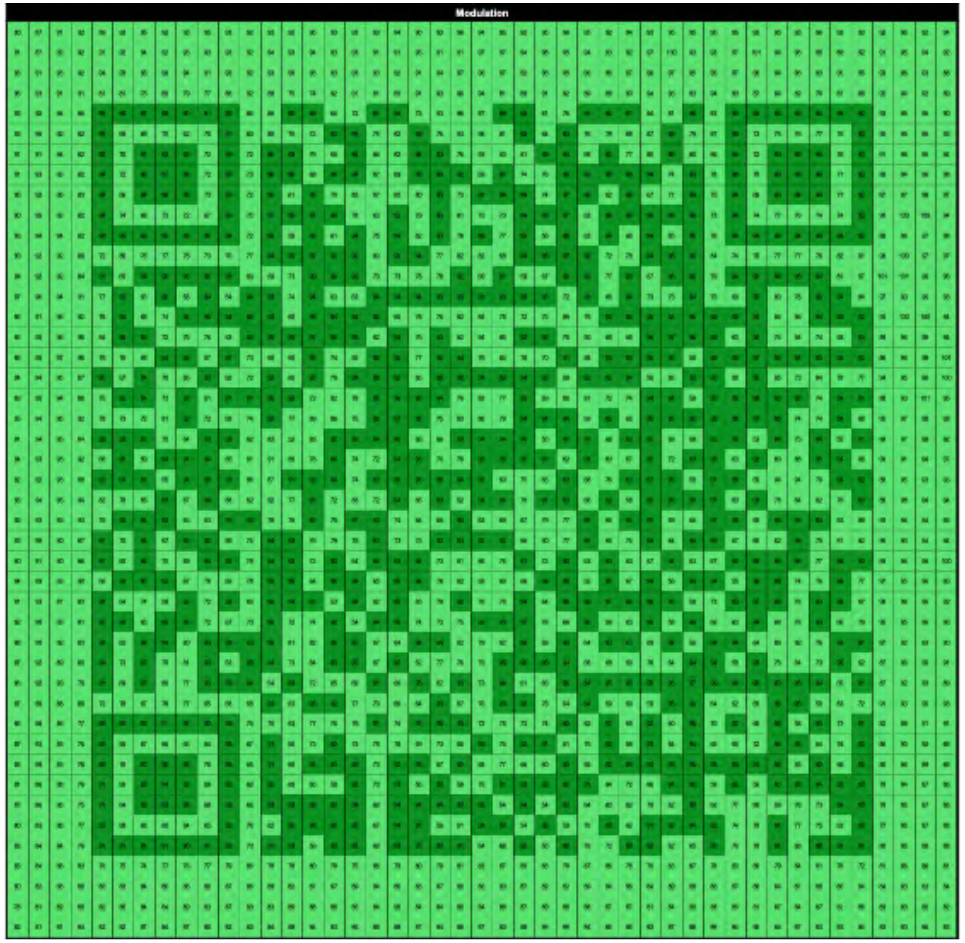
Name	Data	Check
<F1> Required at beginning of data	h	FAIL

Error: Application Header is Expected

Decodation Analysis

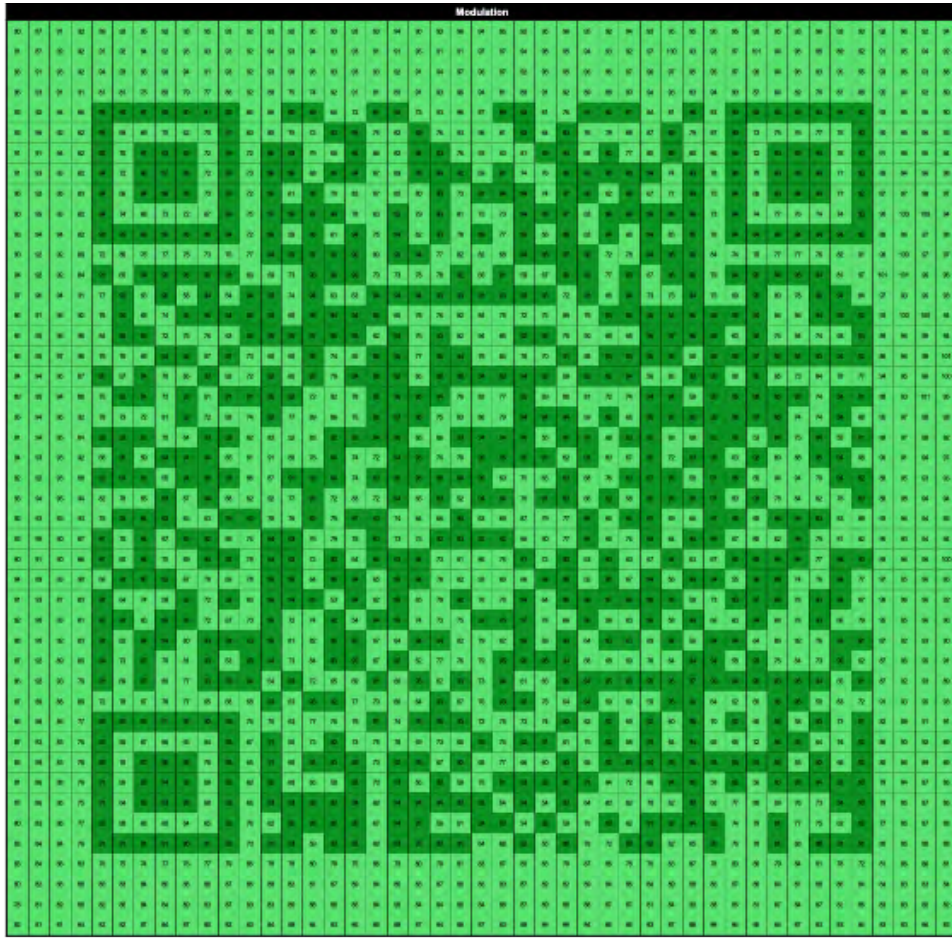
Codeword	Mode	Result
4	BYTE	In Byte mode
83	BYTE	Char count
104	BYTE	h
116	BYTE	t
116	BYTE	t
112	BYTE	p
115	BYTE	s
58	BYTE	:
47	BYTE	/
47	BYTE	/
119	BYTE	w
119	BYTE	w
119	BYTE	w
46	BYTE	.
102	BYTE	f
108	BYTE	l
101	BYTE	e
120	BYTE	x
111	BYTE	o
103	BYTE	g
114	BYTE	r

Modulation



ISO/IEC 15415:2011 Quality Parameters					
1. Unused Error Correction (UEC)		100%		A	PASS
2. Symbol Contrast (SC)	Rl/Rd = 82/3	69%		A	PASS
3a. Modulation (MOD)				A	PASS
3b. Reflectance Margin (RM)				A	PASS
4. Axial Nonuniformity (ANU)		0.8%		A	PASS
5. Grid Nonuniformity (GNU)		0.0%		A	PASS
6. Fixed Pattern Damage (FPD)				A	PASS
7. Upper Left Pattern (ULP)				A	PASS
8. Upper Right Pattern (URP)				A	PASS
9. Lower Left Pattern (LLP)				A	PASS
10. Horizontal Clock Track (HCT)				A	PASS
11. Vertical Clock Track (VCT)				A	PASS
12. Alignment Pattern (ALP)				A	PASS
13. Version Information Block (VIB)					
14. Format Information Block (FIB)				A	PASS
15. DECODE				A	PASS

Data Format Check		
GS1 Application Data Format: FNC1		
Name	Data	Check



COGNEX

DM8072V Verification Report

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Firmware Version: 5.7.10_sr2
Last Calibrated: Mon 10-Feb-2025 03:57 PM

Report Summary

Data	https://www.flexography.org/fta-membership/committees/flexo-quality-consortium-fqc/
Symbology	Direct Mark QR
Device Name	DM8072-6CC766

Verification Grades

Standard	Grade	Aperture	Wavelength	Lighting	Formal Grade
ISO 15415:2011	1.0 (D)	08	660	45	1.0/08/660/45
GS1	Fail (Quality)				

Symbol evaluated using table 6.

Image / Symbol Characteristics

QR Size	37x37
Horizontal BWG	38%
Vertical BWG	39%
Encoded characters	83
Total Codewords	134
Data Codewords	66
Error Correction Budget	24
Errors Corrected	0
Error Capacity Used	0
Error Correction Level	M
Data Mask Pattern	2
Image	Black on white
Nominal X Dim	0.210 mm
Pixels per Module	9.79
ECI	000003

ISO 15415:2011 Quality Parameters

1. Unused Error Correction (UEC)	100%		A	PASS
2. Symbol Contrast (SC)	Rl/Rd = 91/3	87%	A	PASS
3a. Modulation (MOD)			D	FAIL
3b. Reflectance Margin (RM)			D	FAIL
4. Axial Nonuniformity (ANU)		0.2%	A	PASS
5. Grid Nonuniformity (GNU)		0.0%	A	PASS
6. Fixed Pattern Damage (FPD)			D	FAIL
7. Upper Left Pattern (ULP)			C	PASS
8. Upper Right Pattern (URP)			B	PASS
9. Lower Left Pattern (LLP)			C	PASS
10. Horizontal Clock Track (HCT)			C	PASS
11. Vertical Clock Track (VCT)			D	FAIL
12. Alignment Pattern (ALP)			C	PASS
13. Version Information Block (VIB)				
14. Format Information Block (FIB)			B	PASS
15. DECODE			A	PASS

Data Format Check

GS1 Application Data Format: FAIL

Name	Data	Check
<F1> Required at beginning of data	h	FAIL

Error: Application Header is Expected

Encodation Analysis

Codeword	Mode	Result
4	BYTE	In Byte mode
83	BYTE	Char count
104	BYTE	h
116	BYTE	t
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112	BYTE	p
115	BYTE	s
58	BYTE	:
47	BYTE	/
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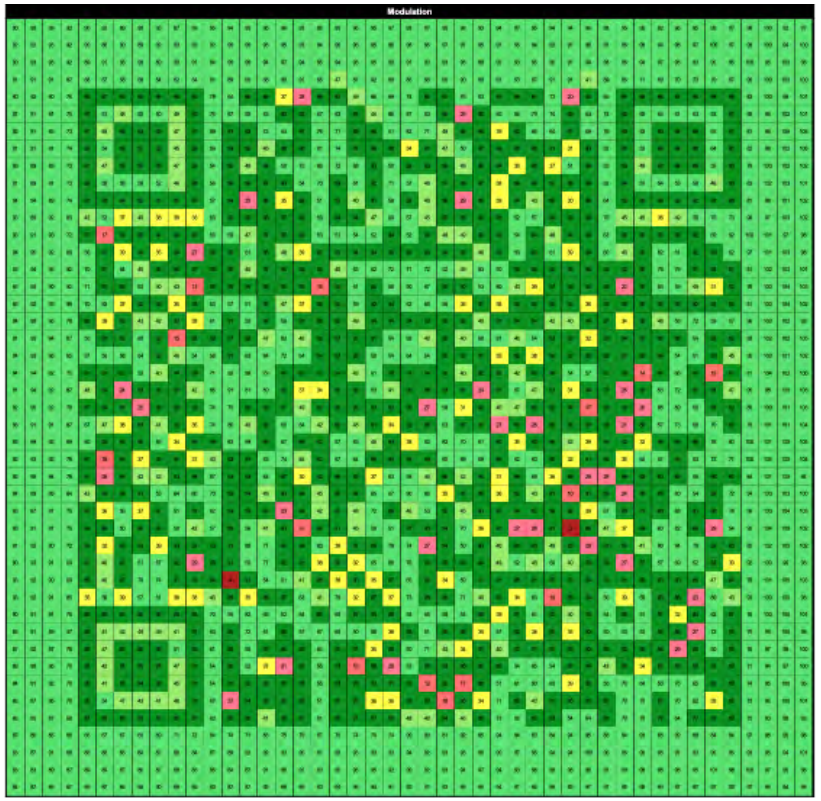
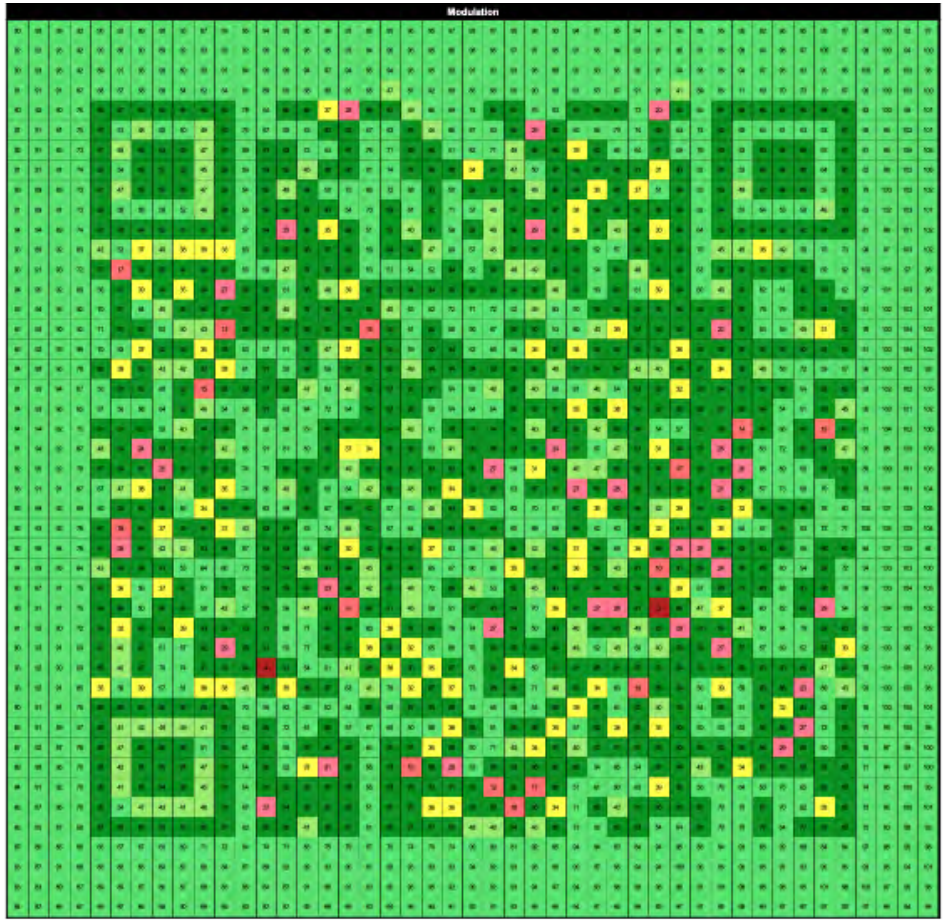
119	BYTE	w
119	BYTE	w
119	BYTE	w
46	BYTE	.
102	BYTE	f
108	BYTE	l
101	BYTE	e
120	BYTE	x
111	BYTE	o
103	BYTE	g
114	BYTE	r

Modulation



ISO 15415:2011 Quality Parameters					
1. Unused Error Correction (UEC)		100%		A	PASS
2. Symbol Contrast (SC)	Rl/Rd = 91/3	87%		A	PASS
3a. Modulation (MOD)				D	FAIL
3b. Reflectance Margin (RM)				D	FAIL
4. Axial Nonuniformity (ANU)		0.2%		A	PASS
5. Grid Nonuniformity (GNU)		0.0%		A	PASS
6. Fixed Pattern Damage (FPD)				D	FAIL
7. Upper Left Pattern (ULP)			4.0	C	PASS
8. Upper Right Pattern (URP)				B	PASS
9. Lower Left Pattern (LLP)			3.0	C	PASS
10. Horizontal Clock Track (HCT)			3.0	C	PASS
11. Vertical Clock Track (VCT)				D	FAIL
12. Alignment Pattern (ALP)			3.0	C	PASS
13. Version Information Block (VIB)			-		
14. Format Information Block (FIB)				B	PASS
15. DECODE				A	PASS

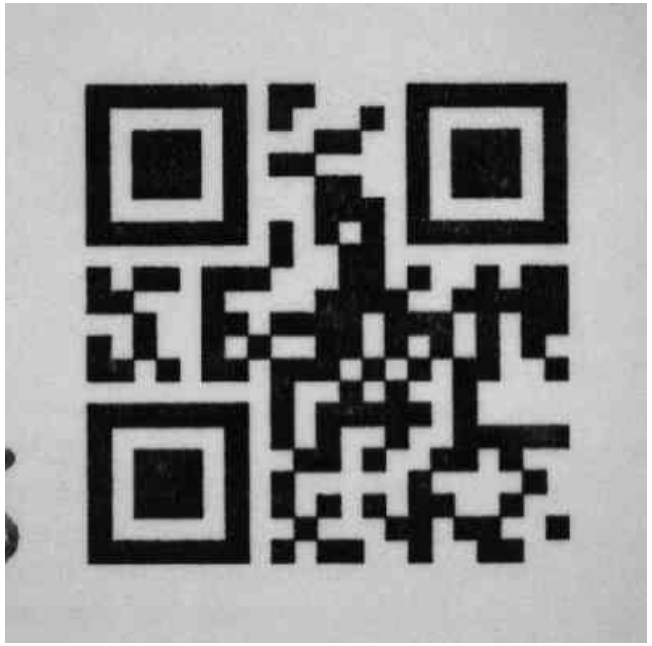


Results

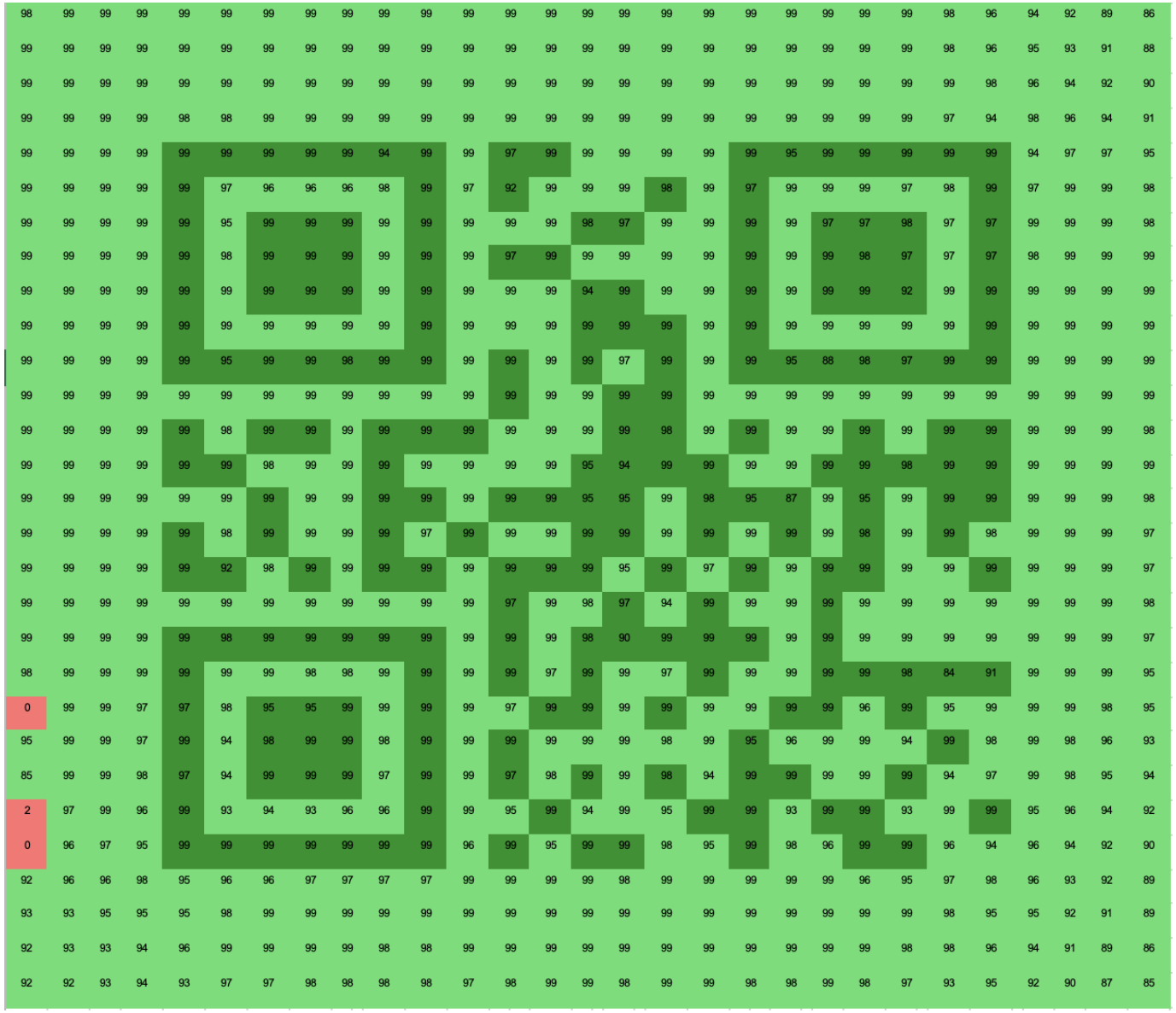
Grading

Grade: 1.0 (D)

1. Unused Error Correction (UEC)	101%	**4.0**	A	PASS
2. Cell Contrast (CC)	92%	**4.0**	A	PASS
3a. Cell Modulation (CMOD)		**4.0**	A	PASS
3b. Reflectance Margin (RM)		**4.0**	A	PASS
4. Axial Nonuniformity (ANU)	0.1%	**4.0**	A	PASS
5. Grid Nonuniformity (GNU)	0.0%	**4.0**	A	PASS
6. Fixed Pattern Damage (FPD)		**1.0**	D	FAIL
7. Upper Left Pattern (ULP)		**4.0**	A	PASS
8. Upper Right Pattern (URP)		**4.0**	A	PASS
9. Lower Left Pattern (LLP)		**1.0**	D	FAIL
10. Horizontal Clock Track (HCT)		**4.0**	A	PASS
11. Vertical Clock Track (VCT)		**4.0**	A	PASS
12. Alignment Pattern (ALP)		**-**		
13. Version Information Block (VIB)		**-**		
14. Format Information Block (FIB)		**4.0**	A	PASS
15. DECODE		**4.0**	A	PASS



6. Fixed Pattern Damage (FPD)	**1.0**	D	FAIL
9. Lower Left Pattern (LLP)	**1.0**	D	FAIL



Smallest Scan by Size

InDesign Generated

21x21	25x25	29x29	33x33	37x37	41x41	44x44
						
.18” x .18”	.2” x .2”	.24” x .24”	.25” x .25”	.25” x .25”	.28” x .28”	1 x ”

Online Generated png

21x21	25x25	29x29	33x33	37x37	41x41	45x45
						
.14” x .14”	.17” x .17”	.19” x .19”	.22” x .22”	.25” x .25”	.27” x .27”	.4” x .4”