

YottaMark, Inc.

Printing Guidelines for Security Codes

November 2007

CONFIDENTIAL

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YottaMark Code Elements

Machine readable barcode:
Datamatrix (this example),
QR, GS1 Databar, Code 128

24 digit human-readable
security code



URL (this example) or SMS

Suitable Printing Technologies



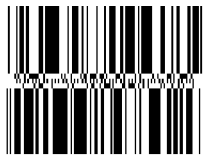
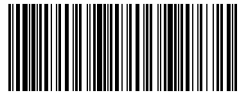
Technology	Advantages	Disadvantages
Thermal transfer printing	High quality, high resolution, multiple media options	Slow, label printing or bag printing only, off-press
Thermal Inkjet (TIJ)	High speed, reasonable resolution (300 dpi), on-press	Label or carton marking only
Continuous Inkjet (CIJ)	Very high speed, direct inline part marking	Low quality, text only – not suitable for barcodes, high maintenance
Steered Beam Laser	Very high speed, direct part marking (including ablating)	Text only – not suitable for barcodes at high speeds; substrate limited
Single Shot Laser Matrix	Can mark a single datamatrix in one shot, very high speed	Not yet in production

Machine Readable Element

- 80 bits of data
- All encoding symbologies are supported by YottaMark – provided they can contain 80 bits. Industry standard 2D symbologies (datamatrix, QR) are recommended due to their widespread acceptance, error correction and efficiency. Non standard symbologies require a ‘closed system’ of printers and readers
- Quiet zone of 2 cell widths is typically required around mark



Barcode Symbologies

Symbology	Advantages	Disadvantages	Example
Datamatrix: ECC200, 24 digit	Large installed base of readers, high error correction (30%), quick read, square or rectangle, GS1 standard, can be very small (0.11")	Cannot be read at POS, cannot be read with cell phones	
QR code: HTTP://VERIFY.YOTT AMARK.COM/ + 24 digit code	Cell phone readable, gaining popularity, good error correction (15%)	Larger footprint required, can't laser mark	
GS1 Databar (expanded stacked) (01)UPC + (21) 16 character code*	Can be read at POS, incorporates UPC	Large footprint, no error correction, cannot be read with cell phones	 01900123456789152111122233
GS1 Code 128	Can be read by cheap scanners on the fly, can be printed fast.	Larger format, no error correction. Cannot be read with cell phones	

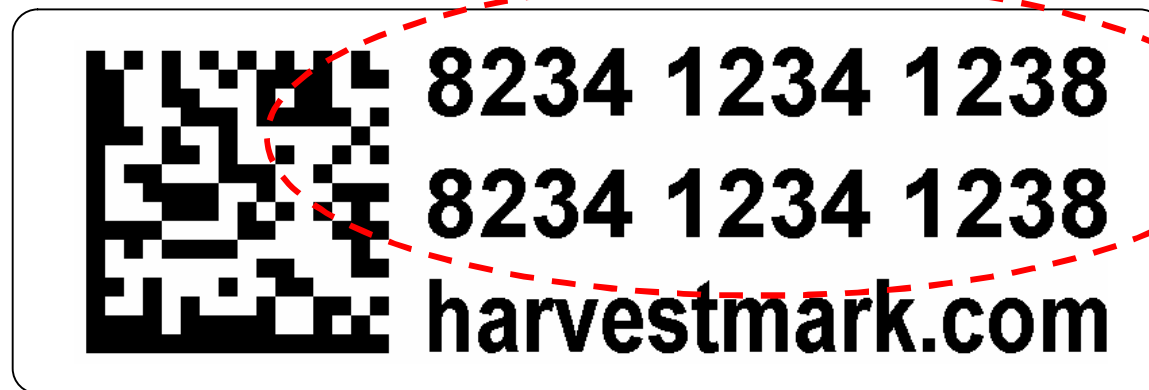
* 16 alphanumeric character code is required to fit in GS1 Databar Primary Code (AI: 21)

Code Size and Resolution - Datamatrix

DATAMATRIX 24 digit numeric code			
16x16 cells/ECC 200 – format #3		12x26 cells/ECC 200 – format #26	
300 dpi	600 dpi	300 dpi	600 dpi
	3 dots/cell 5.0 mil cell size 0.08"/2.0mm		3 dots/cell 5.0 mil cell size 0.06X0.13"/1.5x3.3mm
2 dots/cell 6.7 mil cell size 0.11"/2.7mm	4 dots/cell 6.7 mil cell size 0.11"/2.7mm	2 dots/cell 6.7 mil cell size 0.08X0.17"/2.6X4.4mm	4 dots/cell 6.7 mil cell size 0.08X0.17"/2.1X4.4mm
	5 dots/cell 8.4 mil cell size 0.13"/3.4mm		5 dots/cell 8.4 mil cell size 0.10X0.22"/2.6X5.6mm
3 dots/cell 10.0 mil cell size 0.16"/4.1mm	6 dots/cell 10.0 mil cell size 0.16"/4.1mm	3 dots/cell 10.0 mil cell size 0.12X0.26"/3.1X6.6mm	6 dots/cell 10.0 mil cell size 0.12X0.26"/3.1X6.6mm
	7 dots/cell 11.7 mil cell size 0.19"/4.8mm		7 dots/cell 11.7 mil cell size 0.14X0.30"/3.6X7.8mm
4 dots/cell 13.4 mil cell size 0.21"/5.4mm	8 dots/cell 13.4 mil cell size 0.21"/5.4mm	4 dots/cell 13.4 mil cell size 0.16X0.35"/4.1X8.9mm	4 dots/cell 13.4 mil cell size 0.16X0.35"/4.1X8.9mm

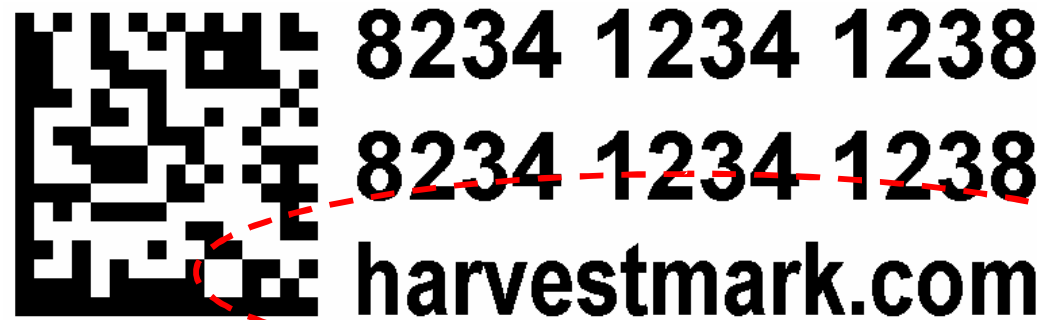
Human Readable Element

- 24 digits
- 6 groups of 4 codes in 2 lines
- Left and right justified
- Sans serif, fixed width font, min 6 pt
- Ariel 8.5pt recommended



URL/SMS Element

- Destination to check code printed beneath code
- Aim to left and right justify if possible
- URL format is:
 - www.yottamark.com
 - Harvestmark.com
 - www.customersite.com
- SMS format is:
 - SMS to NNNNN (where NNNNN is a short code)



8234 1234 1238
8234 1234 1238
harvestmark.com

General Readability

- Imagers cannot read white laser marked codes on red backgrounds
- Imagers and cell phone cameras cannot read codes printed on highly reflective or highly curved surfaces
- Cell phone cameras cannot resolve QR codes smaller than 0.25” (11.7 mil cell size)
- Datamatrix can be inverted (white on black) for laser marking
- Off-the-shelf imagers cannot reliably read datamatrix codes smaller than 6.7 mil cell size. 10.0 mil or greater is recommended for ‘snappy’ reads
- Human readable code can be made smaller if use case is limited inspection (e.g. with loupe). In this case, laser marking is appropriate

Reference Design - DataMatrix

Data Matrix
VARIABLE DATA
23.4 mil cell size
16 x 16 cell
~9.5mm sq.

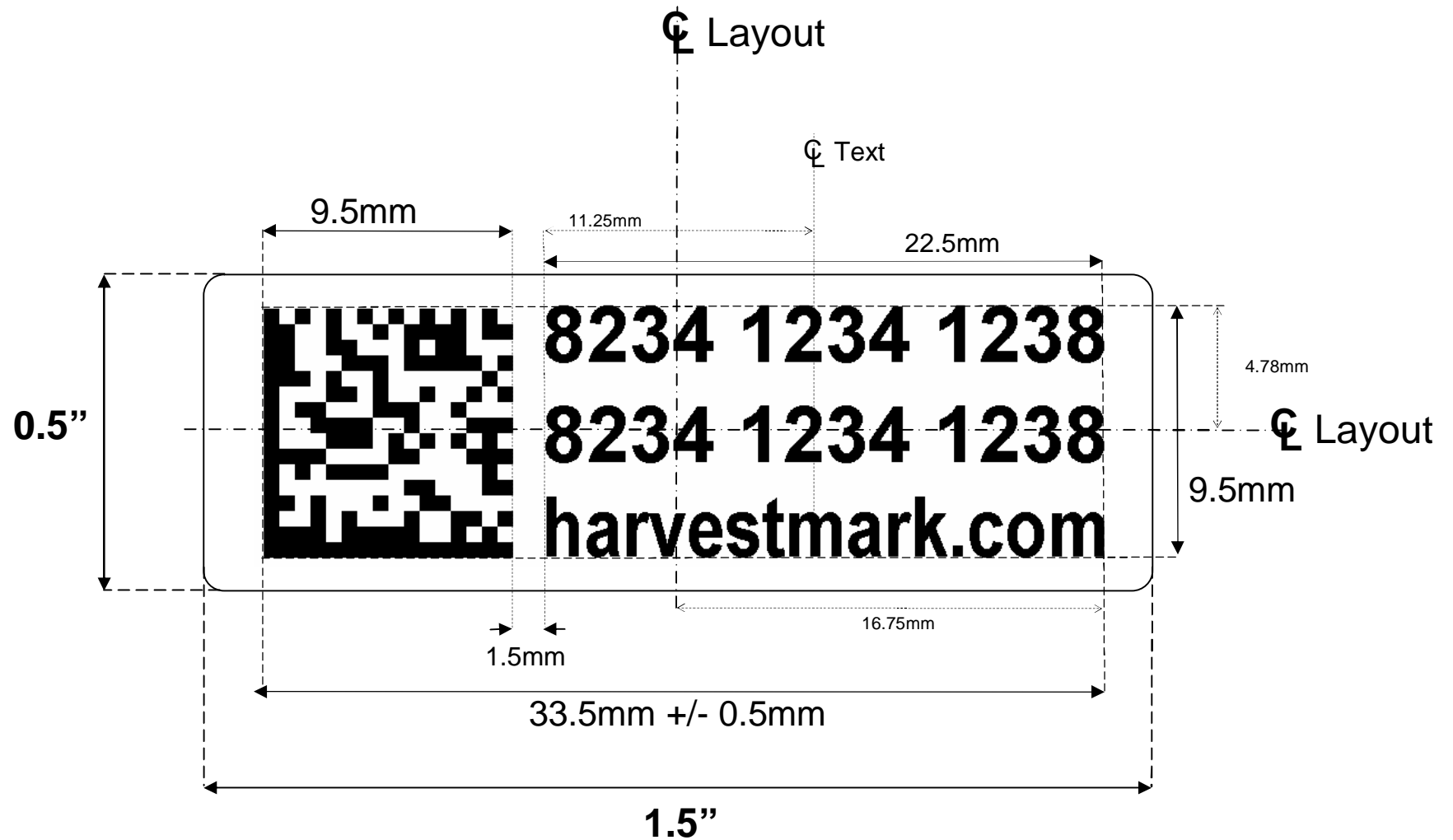
Human-readable
24-digit code
VARIABLE DATA
Arial 8.5 point - Bold



URL
FIXED DATA
Arial Narrow
9 point - Bold

400% ACTUAL SIZE

Reference Design - DataMatrix



400% ACTUAL SIZE

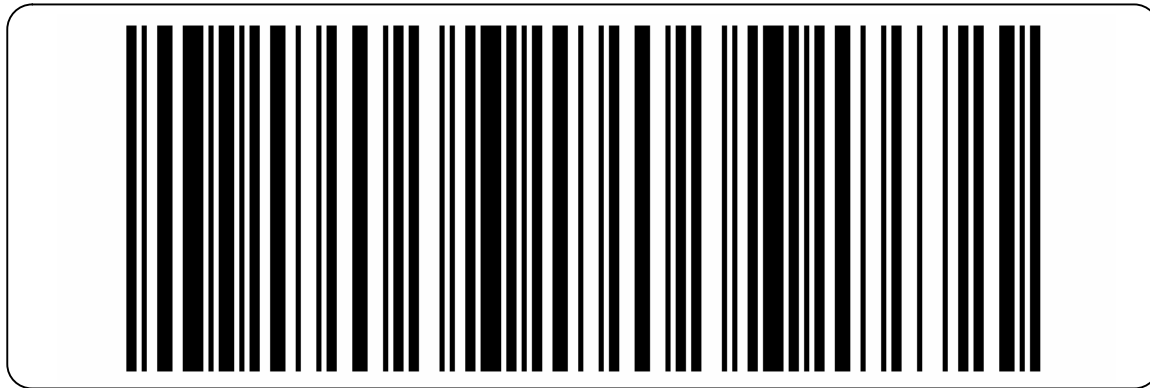
Reference Design - DataMatrix



ACTUAL SIZE

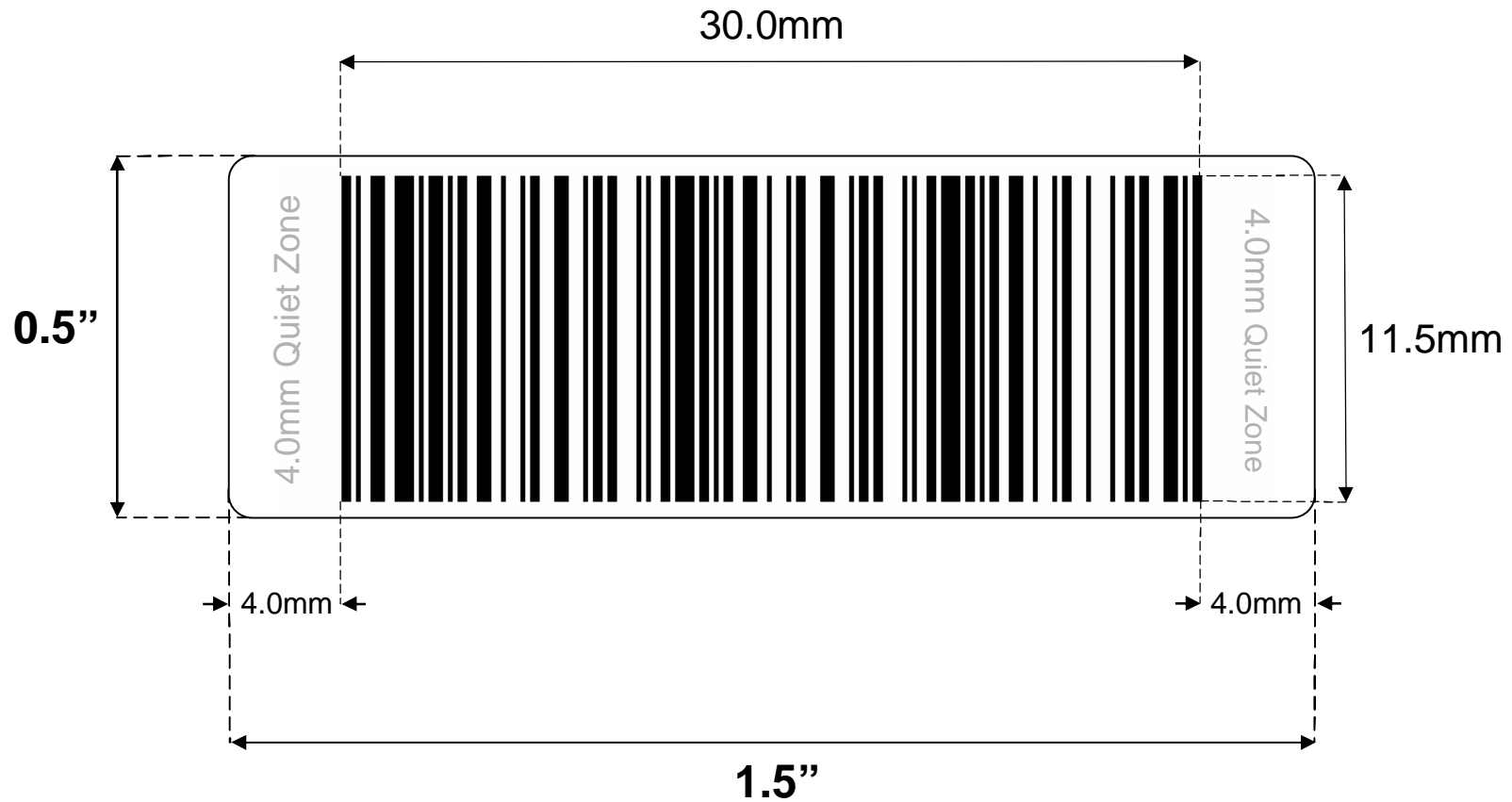
Reference Design – Code 128

- Code 128 – UCC/EAN - 128
- Variable data: 24-digit numeric code (123412341234123412341234)
- X Dimension: 6.7 mils (@300 dpi)
- Density: 27.272 char/in
- Height: 0.450 in
- Human Readable - optional



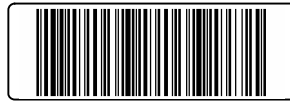
400% ACTUAL SIZE

Reference Design – Code 128



400% ACTUAL SIZE

Reference Design – Code 128



ACTUAL SIZE

Combining with Other Features

- YottaMark codes can be combined with other layers, provided they do not interfere with readability
- Codes may be printed alongside holograms or other OVIs
- Numeric code can be laser marked on OVI

EXAMPLES



Design options

	Machine Readable Element	Human Readable Element	URL/SMS Element
Reference Design	Square datamatrix 23.4 mil cell size	24 digits Arial 8.5 point - Bold	yottamark.com or harvestmark.com
Cell Phone code	0.25" QR code: HTTP://VERIFY.YOTTAMARK.COM/[24 DIGIT CODE]	24 digit code	Optional
HarvestMark Kiosk readable	Square datamatrix 23.4 mil cell size	24 digits Arial 8.5 point - Bold	harvestmark.com
Laser marked part	None	24 digits	optional
Covert code	Square datamatrix 23.4 mil cell size thermal transfer printed with covert ribbon	None	none
Inkjet printed part	None	24 digits	optional

Standards

- Datamatrix is covered by an ISO standard, ISO/IEC16022— International Symbology Specification, Data Matrix, and is in the public domain, which means it can be used free of any licensing or royalties.
- ISO/IEC 15415 – 2-D Print Quality Standard

Printing Rules

- Preservation of sequence
 - In many use cases, the sequence of codes as generated must be preserved, therefore during conversion, the following must be avoided:
 - Splicing labels out of sequence
 - Replacing of missing labels with spare labels
 - Bad print labels can be scrapped out and do not need to be replaced.
- Roll tracking
 - Some applications require a known number of labels on a roll (e.g. 1,000) with a predictable start and end code