2D barcodes for Retail POS – Things you need to know

Fact Sheet

The retail industry is undergoing a global transition to 2D Barcodes, transforming the way we do business and offering new opportunities for all stakeholders.

*Industry has defined the date of **2027** when all retailers will aim to scan 2D Barcodes at retail point-of-sale (POS), worldwide.*

Features of 2D barcodes

They are smaller than most 1D barcodes, but they can carry more data and are more reliable due to error-correction capability. They require an image-based scanner to read, so traditional laser scanners cannot scan them

Transition period requirements

Today EAN/UPC and GS1 DataBar Retail POS family are the linear barcodes being scanned at POS.

As any new technology needs time to get pervasively adopted and to ensure interoperability during the transition period in open supply chain scenarios the 2D barcodes can be **in addition** to the mandatory linear barcodes.

When a 2D barcode is added along with a linear barcode on a product please note the **same** GTIN that is encoded in the linear barcode needs to be encoded in the 2D barcode as well as it is identifying the same product.

By the end of 2027 we hope to hit the tipping point that will allow 2D barcode to be interoperable all over the world - so you can have a single barcode which can be either EAN/UPC/GS1 DataBar Retail POS family **or** any of the approved 2D barcodes.

Note: *EAN/UPC or GS1 DataBar is not going to go away. As some manufacturers might not see the value of the additional use cases unlocked by 2D barcodes.*

2D barcodes approved for Retail POS scanning

The three 2D barcodes approved for Retail POS scanning:

GS1 DataMatrix with GS1 element string syntax - Best for use cases that do not require full web compatibility, but a smaller barcode than the linear options and/or additional data beyond the Global Trade Item Number (GTIN) is needed

(01)09506000149301
(10)AB-27
(17)271231

Important: *GS1 DataMatrix is the preferred data carrier if your product(s) falls under the regulated healthcare category*

QR Code with GS1 Digital Link URI syntax - Best for use cases with requirements for consumer engagement and full mobile device compatibility.

https://id.gs1.org/01/09506000149301/
10/AB-27?17=271213

Data Matrix with GS1 Digital Link URI syntax - Can be for use cases with requirements for consumer engagement and limited space. Data Matrix is not fully compatible with mobile device default camera app.

https://id.gs1.org/01/09506000149301/
10/AB-27?17=271213

Note: *Only the uncompressed form of GS1 Digital Link URI syntax is approved*

Placement considerations

Preferred barcode placement is on the lower right quadrant of the back, respecting the proper Quiet Zone areas around the barcode and the edge rule.

When a linear barcode and a 2D barcode are both being used for retail POS applications, the entire 2D barcode including Quiet Zones SHOULD be placed within a 50 mm radius from the centre of the linear barcode.

Note: *Optical effects in the image capture process require that the 2D barcodes be printed at 1.5 times the equivalent X-dimension allowed for linear symbols. In the above image the x-dimension used for EAN-13 is 0.33mm and the x-dim used for the QR Code with GS1 Digital Link is 0.495mm.*

X-dimension: *The nominal width (& height for 2D barcodes) of a single module is equivalent. The specified width of the narrowest element of a barcode*

Size considerations for Retail POS

Table 1: Trade items scanned in general retail POS only

Barcode	Min x-dim (mm)	Tar x-dim (mm)	Max x-dim (mm)	Quiet zones
GS1 DataMatrix	0.396	0.495	0.990	1x on all four sides
Data Matrix with GS1 DL URI	0.396	0.495	0.990	1x on all four sides
QR Code with GS1 DL URI	0.396	0.495	0.990	4x on all four sides

Table 2: Trade items scanned in general retail POS and general distribution

Barcode	Min x-dim (mm)	Tar x-dim (mm)	Max x-dim (mm)	Quiet zones
GS1 DataMatrix	0.743	0.990	0.990	1x on all four sides
Data Matrix with GS1 DL URI	0.743	0.990	0.990	1x on all four sides
QR Code with GS1 DL URI	0.743	0.990	0.990	4x on all four sides

Note: *Optical effects in the image capture process require that the Data Matrix and QR Code symbols be printed at 1.5 times the equivalent X-dimension allowed for linear symbols.*

Human Readable interpretation (HRI) rules

HRI rules are provided to standardise printing requirements and facilitate training of staff on how to deal with GS1 AIDC data carriers that fail to scan or read. The barcodes for point-of-sale (POS) SHALL have GTIN in HRI adjacent to the barcode.

A clearly legible font SHALL be used such as OCR-B or Arial are preferred. Bold, italics, light or narrow versions of a font SHOULD NOT be used.

GS1 DataBar Retail POS family, GS1 DataMatrix, Data Matrix (GS1 Digital Link URI) and QR Code (GS1 Digital Link URI) SHALL display (01) followed by the encoded GTIN in a 14-digit format.

GS1 DataMatrix
(GS1 element string syntax)

(01)09524810000339

QR Code
(GS1 Digital Link URI syntax)

(01)09524810000339

Adjacent Placement: When a linear EAN-8, EAN-13 or UPC-A barcode and 2D barcode are adjacent on a general retail consumer trade item, HRI for the GTIN is only required for the linear barcode.

Non-Adjacent Placement: When a linear EAN-8, EAN-13, UPC-A or UPC-E barcode and 2D barcode are unable to be adjacent, then the GTIN SHOULD accompany both.

HRI for any additional consumer engagement barcode encoding GS1 Digital Link URI SHALL be left to the discretion of the brand owner.

In the future, when the 2D barcode is the only barcode on the object, the 14-digit GTIN HRI will be required.

Support for implementing 2D barcodes:

GS1 New Zealand's 2D Starter Workshop
The Starter Workshop is perfect for organisations ready to implement a pilot programme. Work with our 2D Barcodes Lead to identify key benefits and opportunities and lay the foundations for your pilot programme. You'll receive a post-workshop summary, framework for pilot planning and a high level roadmap to get you started.

Contact GS1 New Zealand

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