

GS1-128 barcode

Fact Sheet

The GS1-128 barcode is used to encode a GTIN of any length and can also encode attribute data using Application Identifiers (AIs). The GS1-128 barcode is intended for scanning in the General Distribution and regulated Healthcare environments.

When encoding a GTIN-13 or GTIN-12 in a GS1-128 barcode, one or two filler zero(s), respectively, must be added before the GTIN to compose 14 digits.

Figure 1: GTIN-13 with a filler zero encoded in a GS1-128 barcode



Note: Figure is not to scale. Measurements are in millimetres.

Maximum Length

The maximum length of a GS1-128 barcode is 165.10mm in length, including Quiet Zones.

The number of encoded and transmitted data characters in a single GS1-128 barcode SHALL NOT exceed 48 characters. This includes GS1 Application Identifiers and the Function 1 Symbol Character (FNC1) when used as a field separator but excludes auxiliary characters and the Symbol Check Character (Modulo 103).

Note: When counting the number of characters in a GS1-128 symbol, the FNC1 is only included when used as a field separator.

Concatenation

Concatenation (stringing data elements together) is an effective means for presenting multiple element strings in a single GS1-128 barcode and is used to conserve label space and optimise scanning operations when permitted by the application standard.

When concatenating a mixture of predefined length and other element strings, the predefined element strings SHOULD appear together before the other element strings. This usually results in a shorter linear barcode.

When it is possible for both parts of the data content to be represented in a GS1-128 barcode, concatenation into one barcode **MUST** be considered. Barcodes for general distribution scanning containing data essential for complete product identification (e.g., trade measurements) **SHALL** always be aligned with and to the right of the other barcode.

For the rules on concatenation of element strings, see Section 7.8.6 of the GS1 General Specifications.

Concatenation of GTIN and GTIN attributes into one symbol is the preferred option for Regulated healthcare retail consumer trade items to validate connectivity between GTIN and attributes. Separating GTIN attributes from the GTIN in the barcode **SHOULD** be avoided wherever possible as improper association is possible. The scenario takes into account the use of EAN/UPC which is widely used in retail pharmacies to capture GTIN but once a market is prepared to support a data carrier which can encode GTIN plus the GTIN attributes, this data carrier **SHOULD** replace EAN/UPC when GTIN attributes are required.

Concatenation may not be desirable in all circumstances (e.g., GS1 Logistic Labels are often constructed using multiple rows of barcode), in such cases the barcode containing the additional attribute data encoded using GS1 Application Identifiers **SHOULD** be printed in close proximity to the barcode containing the GS1 identification key.

Magnification (X dimension)

The size of the GS1-128 barcode depends on:

- the X dimension (module width) chosen
- the number of characters encoded
- the number of non-numeric characters in the data

For GS1-128 barcodes that are to be scanned in a General Distribution (automated) Scanning environment, the X dimension range is 0.495mm to 1.02mm (magnifications between 48.7% and 100%). For other scanning environments, the X dimension range is 0.25mm to 0.495mm (magnifications between 25% and 48.7%).

Mathematically, the width of a GS1-128 barcode (W) is:

$$W = (11N + 66) X$$

Where,

- 11 is the number of modules per symbol character,
- N is the number of symbol characters encoded, excluding the Start and Stop Characters and Symbol Check Character.
- 66 is the number of auxiliary characters, including the Quiet Zones, and
- X is the X dimension (module width), which at 100% magnification is 1.02mm.

Height of Bars

The height of a GS1-128 symbol depends on X dimension and the specific application requirements. For scanning in a General Distribution (automated) scanning environment, the minimum bar height for a GS1-128 barcode at a given X dimension is 31.75mm. Please see section 5.12.3 of the GS1 General Specifications for symbol height specifications.

- Find the appropriate GS1 system application area using figure 5.12.2.6-1.
- If the application area references two symbol specification tables, use the decision tree in figure 5.12.2.6-2 to determine which one to use.

Human Readable Interpretation (HRI)

The HRI should be placed below the barcode, must show all digits encoded in the barcode and be grouped together wherever physically possible.

A clearly legible font such as OCR-B or Sans serif font types such as Arial are preferred. Bold, italics, light or narrow versions of a font SHOULD NOT be used. The font size SHOULD be at least 2mm in height. Parentheses shall surround AIs in HRI but are not encoded in the GS1-128 barcode.

Table 2: GS1-128 barcode dimensions

Magnification	X dimension	Width	Bar Height	Quiet Zones
25%	0.25	34.04	13.00	2.54
30%	0.30	40.84	13.00	3.05
35%	0.36	47.65	13.00	3.56
40%	0.41	54.46	13.00	4.06
45%	0.46	61.26	13.00	4.57
50%	0.51	68.07	32.00	5.08
55%	0.56	74.88	32.00	5.59
60%	0.61	81.68	32.00	6.10
65%	0.66	88.49	32.00	6.60
70%	0.71	95.30	32.00	7.11
75%	0.76	102.11	32.00	7.62
80%	0.81	108.91	32.00	8.13
85%	0.86	115.72	32.00	8.64
90%	0.91	122.53	32.00	9.14
95%	0.97	129.33	32.00	9.65
100%	1.02	136.14	32.00	10.16

Notes:

- Width = width of barcode excluding Quiet Zones.
- It is recommended to always allow slightly more than the minimum required Quiet Zone to allow for any possible ink spread or registration issues.
- All measurements are in millimetres, correct to two decimal places