

**MICROSCAN.**

# LVS<sup>®</sup> 95XX Frequently Asked Questions

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### **GS1 Solution Partner**



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## IMPORTANT: Read This Before You Continue

### Contact Microscan

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### Helpful Notes

1. DO NOT unplug or plug in your LVS-95XX system USB while the software is open.
2. If there is only one admin account (with permissions to add\remove operators), this account will never be locked out on software version 3.0.9HH and higher.
3. Default admin account: Operator ID: **admin** Password: **admin**
4. Prior to calibration, clean your system according to the cleaning instructions in the Operations manual to avoid calibration issues.
5. The I9500.mdb file is the LVS-95XX database; this is where your factory calibration is stored. When installing on a new computer from a link, you will be notified that Factory Calibration is missing. Go to the original installation media (installation flash drive) and recover your i9500.mdb file. (See appendix J in the manuals folder)
6. On-site or on-line training is available for your LVS-95XX system. For more information, contact [info@microscan.com](mailto:info@microscan.com).
7. Throughout this document, “Calibrated Conformance Standard Test Card” is referred to as “Calibration Card.”

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## Q1. How can I acquire an Operations Manual?

An electronic version of the “LVS-95XX Series Operations Manual” in .pdf format is located on the Installation media (installation flash drive) that came with the software. After the LVS-95XX software is installed, a shortcut to the “Manuals” folder is automatically saved on the computer desktop. If you do not have the Installation media or the “Manuals” folder, contact [helpdesk@microscan.com](mailto:helpdesk@microscan.com) for a quote.

## Q2. How do I reset my password?

- If there is only one administrator account (with permissions to add/remove operators), this administrator account will never be locked out on software versions 3.0.9HH and higher.
- The administrator can unlock the account by following the instructions in Step 3 below.
- After three attempts to login with an incorrect password, the system locks out the operator. If the locked out account is an administrator, use the secondary administrator to unlock the account. If all administrator accounts are locked out, you are required to have the password of the day.

1. Contact Microscan to obtain the password of the day.
2. Log in to the LVS-95XX software. Enter **lvs** in the “Operator ID” field. Enter the password of the day obtained by Microscan in the “Password” field. Click the “OK” button. You are now logged in to the LVS-95XX software.
3. Click the “Setup” tab and then click the “Setup Operators” button.

The screenshot shows the LVS-95XX software interface with the 'Setup' tab selected. The 'Setup operators' button is highlighted with a red box. The interface includes the following sections:

- Welcome** (selected tab)
- Camera**: Off
- Grading mode**: Automatic, Manual, Auto-sector
- Current information**: Local Time: 05-Jun-2015 13:41, GMT: 05-Jun-2015 17:41, Time Zone: GMT-4
- Application standards**: ISO/IEC 15415/15416, Configure available standards, Override aperture
- System Settings**: Minimum passing score: 2.5, Days before password expires: n/a, Minutes before auto logoff: n/a, Days before calibration needed: n/a, Allow non-ISO blemish to affect grade, QRCode quiet zone >1X, Automatically start program
- Optional features**: List of options (choose one): Single sector verification (normal), Optional Features Activation
- Change password** button
- Setup operators** button (highlighted)
- Product lookup** button
- Distributor information** button

4. Select the desired operator name from the “Operators” list.
5. Click the “Change this operator” button.
6. Uncheck, and then recheck any of the permissions (see below).
7. Click the “Save Changes” button, and then click the “Done” button.

**Permissions**

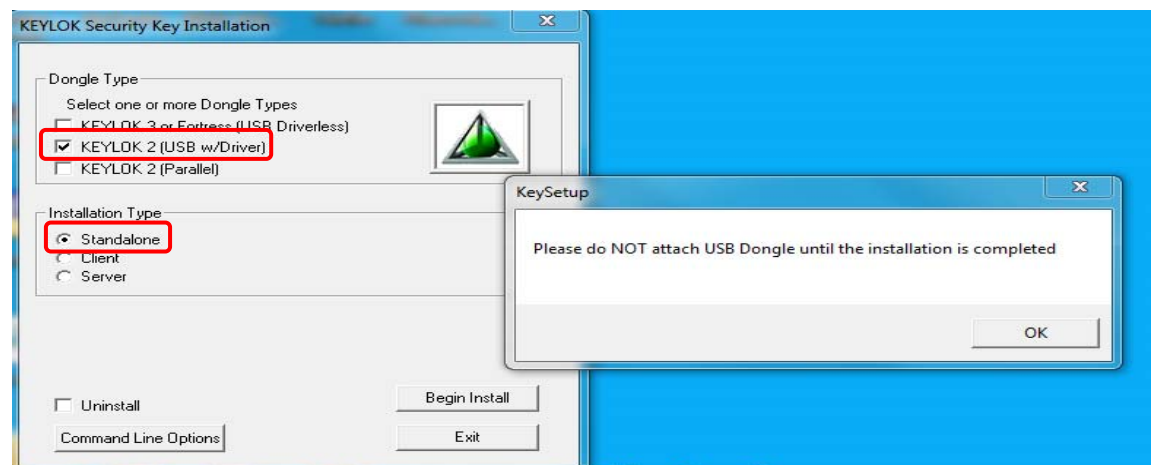
- Allow Add/Change operator**
- Allow Calibration**
- Allow change Setup Options**
- Allow Pass/Fail ISO**
- Allow Full ISO**
- Allow create or edit app**
- Allow change archive file**

### Q3. When logging onto my system, I am receiving the following error message: *“The machine is not authorized to perform this function.”*

This error message is typically a result of the USB serial dongle not being recognized. To resolve this issue, close the LVS-95XX software and unplug the USB from your computer that is attached to the system. Plug back in another USB port on your computer wait 10 seconds. Then, reopen the software. If this step does not resolve the issue, follow the remaining steps.

**Make sure that you have administrator privileges to the computer prior to install.**

1. Close the LVS-95XX software.
2. Unplug the USB cable of the Microscan system from the computer.
3. Go to Installation Flash Drive → “Other setup” folder → click “Keysetup.exe.”
4. Select “Keylok 2 (USB w/ Driver)” and “Standalone.”
5. Click the “Begin Install” button. A message appears indicating that all files have been copied. Close the dialog box.

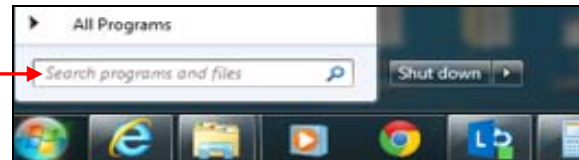



6. Plug in the USB cable.
7. Windows should report a "New hardware found" message. Select "No, not this time."
8. On the next screen, select "Install software automatically."
9. Click "Finish."

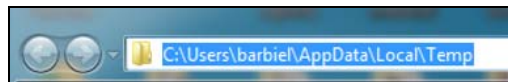



10. Run the LVS-95XX software. You should be able to correctly log on to your system and the “The machine is not authorized to perform this function” message should not appear. If the message appears, follow the next step.
11. If the “The machine is not authorized to perform this function” appears again, and this is a new installation, click on the Windows search bar and search for **%temp%**.

In the search field enter: **%temp%**



12. Open the temp folder and scroll down to locate the Keyloc icon. 
13. If the icon is present, go to the address bar and copy the file path.



14. Open your Device Manager and click on the USB that has the warning icon. 
15. Right-click and select “Update Driver Software.”
16. Select “Browse my computer for driver software” and paste in the link copied from the address bar from the temp file into the browse bar.
17. Click “Next.” The drivers will be automatically installed.
18. If the issue persists, please make sure that firewalls are allowing for installation.

## Q4. How do I acquire the latest software updates?

1. Send an e-mail to [helpdesk@microscan.com](mailto:helpdesk@microscan.com) and request the latest version of software for your system. In the e-mail, include the following:
  - System Model (LVS-9510, LVS-9570, LVS-9580)
  - System Serial Number (located on system)
  - Current version of software that you are running (located on “Welcome” tab)
  - Windows Operating System that you are using
2. Microscan will send you a link to download the latest software. **Do not plug in your system until installation is complete.** Make sure that you have administrator privileges to download the software. Save the software to your desktop and unzip the extract files prior to installing. You MUST install the software with administrative rights.
3. Prior to installation, copy your i9500.mdb (the path can be found on the “Archive” tab → “Change SQL Connection” button → Data Source). Save the file to place back into the specified folder when complete. If you do not save off your i9500.mdb file, you will be prompted when opening the software to perform a factory calibration or that factory calibration is not found.
4. Double-click on “setup.exe” to install the software and follow the prompts accordingly.
5. After installation is complete, connect the USB to your LVS-95XX system. Right-click on the LVS-95XX icon and run as an administrator.

## Q5. My code is graded an “F” and the following message appears: “Required <FNC1> not found.” Why is it that when I switch application standards to ISO/IEC 15415/15416, I do not receive the error message?

<FNC1> is a special character reserved for GS1-compliant symbols when using Code 128, QR code or Data Matrix. If “GS1 General Specifications” is selected as the Application Standard on the “Setup” tab, and FNC1 is not encoded in the first position of the code, the code will automatically be graded an “F” since it is not GS1 compliant. If the code is intended to be GS1 compliant, notify the originator that ISO/IEC 15415/15416 does not require that FNC1 be present. If you are not grading a GS1 barcode, change your Application Standard on the “Setup” tab to “ISO/IEC 15415/15416.”

## Q6. Why am I receiving a “Calibration Failed” message when I attempt to calibrate?

Follow the suggestions below:

1. Make sure your system is clean and free of debris, dust, dirt, oils or other contaminants.
2. If using an LVS-95XX, use the top cover provided with the system and turn off any overhead lighting. Then, turn on the system and check that all LEDs are illuminated on the light tray; if they are not, the light tray will need to be replaced.
3. Confirm that the serial number on the LVS-95XX system matches the serial number on the Installation Flash Drive.
4. Confirm the following on your calibration card:
  - The serial number on the calibration card matches the serial number on the LVS-95XX system
  - The values on the GS1 CC match the “Goal” values on the “Calibration” tab (Decodability, Contrast, Modulation, and Rmax)
  - The calibration card it is not expired
  - The calibration card is not damaged
5. If calibration does not pass after attempting the above suggestions, contact Microscan technical support ([helpdesk@microscan.com](mailto:helpdesk@microscan.com)) and provide the following information:
  - LVS-95XX system model number (example: LVS-9510)
  - LVS-95XX system serial number (located on system)
  - LVS-95XX software version running on your computer (located on “Welcome” tab)

### Runtime 214:

- “Runtime 214” will be shown if the USB is unplugged while the software is running. Close the software, plug in the USB and restart the software.
- “Runtime 214” can also be associated with older revisions of software, which is an indication that your database is full or corrupt. This issue can be resolved by updating the software and performing a Factory Calibration. Prior to updating the software, if you wish to keep previous data, you must save off the i9500.mdb file and rename it or copy it from your installation media as described in “Appendix J: Factory Calibration Not Found.”

## Q7. How do I replace the light tray on my LVS-95XX system?

Send an e-mail to [helpdesk@microscan.com](mailto:helpdesk@microscan.com) and request a quote for a light tray. In your e-mail, include the model number and serial number of your LVS-95XX system. When you receive the light tray, replacement instructions are included with the package.

## Q8. How do I perform Factory Calibration?

Read the instructions in “Appendix J: Factory Calibration Not Found” located on the installation media (installation flash drive) that came with your system. If you do not have the installation media that came with your system, contact [helpdesk@microscan.com](mailto:helpdesk@microscan.com).


To perform Factory Calibration, you must contact Microscan Technical Support for the password of the day: [helpdesk@microscan.com](mailto:helpdesk@microscan.com)

## Q9. I have placed a label in the field of view. Why does the picture remain black?

1. Make sure the system camera is turned on. Do this by clicking the “Setup” tab. Within the “Camera” section, make sure the “ON” option is selected. If this step does not work, follow the remaining steps.
2. Shut down the LVS-95XX software.
3. Right-click on “My Computer” → select “Properties” → “Hardware” tab → “Device Manager” button.
4. Locate an entry called “Imaging Devices.” If the entry exists, check that it contains a “Lumenera Imaging Device” or a “Microscan camera.” If the entry does not exist, contact Microscan Technical Support at [helpdesk@microscan.com](mailto:helpdesk@microscan.com).

## Q10. How can I change the format of my reports?

1. Refer to “Appendix G: Special Features” for detailed instructions on changing report formats.

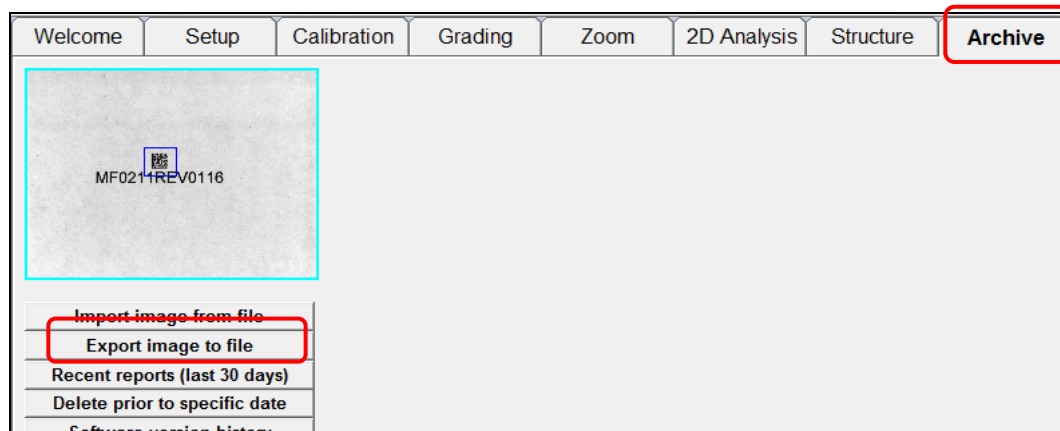
 **Note:** When you install the LVS-95XX software, a shortcut icon labeled “Manuals” (see right) is automatically installed on the computer’s desktop. This shortcut contains “Appendix G: Special Features.”



2. Some changes require you to have the password of the day. Contact [helpdesk@microscan.com](mailto:helpdesk@microscan.com) to obtain the password of the day.

## Q11. How can I send a barcode to Microscan for analysis when the barcode is receiving failing or poor grades?

1. Place your barcode on the system window (grading is not required).
2. Click the “Archive” tab and select “Export image to file.”



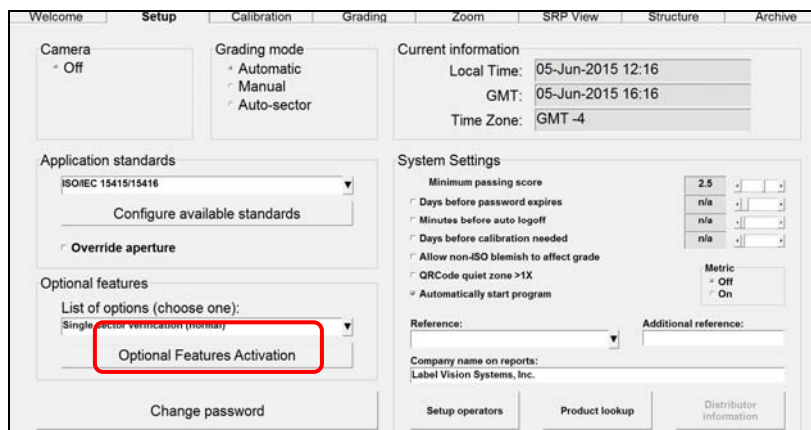
3. Save the image as a .bmp.
4. Send an e-mail to Microscan Technical Support ([helpdesk@microscan.com](mailto:helpdesk@microscan.com)) and include the .bmp, the report from the image and below information:
  - LVS-95XX model number (such as LVS-9510)
  - LVS-95XX serial number (located on system)
  - LVS-95XX software version running on your computer (located on “Welcome” tab)
5. Microscan will send you a report defining the issues of the barcode up to a maximum of five barcodes.

If you have more than five barcodes that you would like analyzed and verified by Microscan, you must send an e-mail to the Microscan sales team ([info@microscan.com](mailto:info@microscan.com)) and request a quote for barcode analysis. Include the following information in your e-mail:

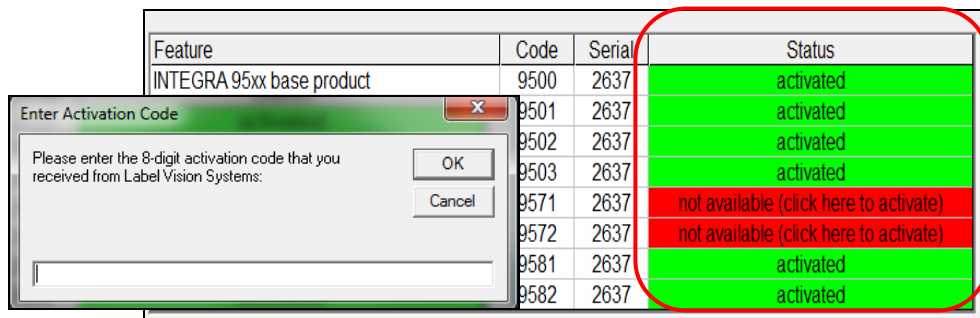
- The number of barcodes you want analyzed and verified
- LVS-95XX serial number and model number
- LVS-95XX software version running on your computer

## Q12. How do I activate an optional feature?

1. Optional features must be purchased through Microscan by sending an e-mail to the Microscan sales team: [info@microscan.com](mailto:info@microscan.com).
2. After the optional feature is purchased, you will receive an 8-digit activation code.
3. Click the “Setup” tab and then click the “Optional Features Activation” button.



4. Under the “Status” column, click on the optional feature you wish to activate.
  - Features highlighted in green are activated.
  - Features highlighted in red are not activated. To activate the feature, double-click in the red area and enter the 8-digit authorization code when prompted.



5. Close and then reopen the LVS-95XX software. The optional feature is now activated.
6. Detailed instructions on using each optional feature is documented in “Appendix G: Special Features” located in the “Manuals” folder.

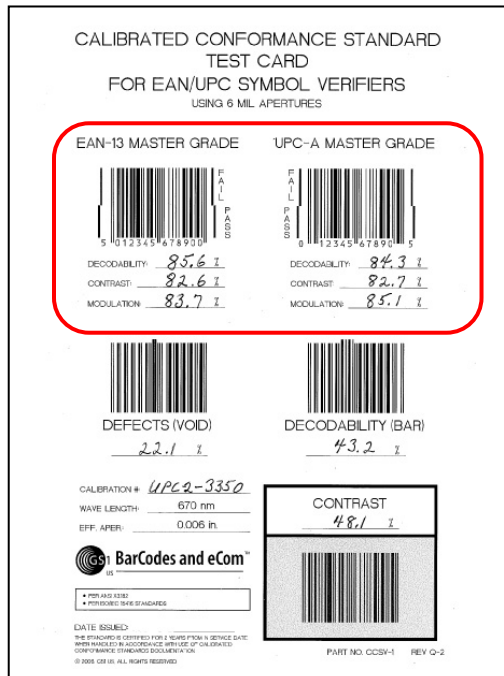
### Optional Features Trial Period

All unpurchased optional features can be enabled for a free 10-day trial period (the “Enhanced Application Identifier Verification” feature requires training prior to use). Click on the green area at the bottom of the screen (see below) to enable an optional feature for the trial period. An optional feature can be selected only one time for the trial period.

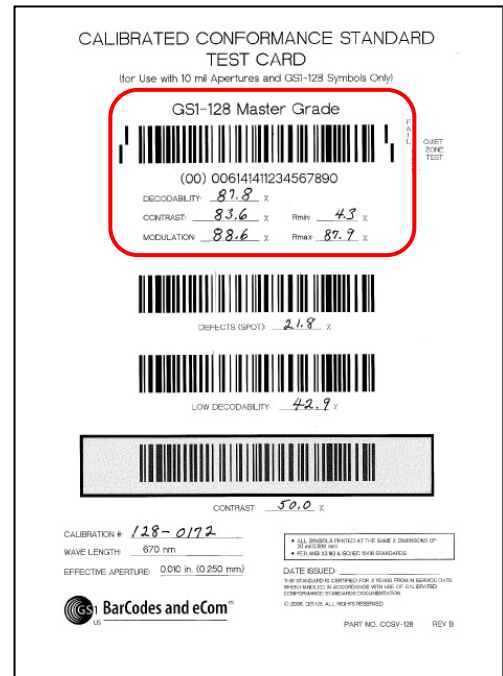


## Q13. What symbol do I use for calibration on my Calibration Card?

1. Microscan supplies two calibration cards: EAN/UPC and GS1-128 (see examples below). You will receive the calibration card that is to be used to calibrate your LVS-95XX system; this card will be the **ONLY** calibration card that you will use for calibration purposes. Locate your calibration card and follow the remaining steps.



**EAN/UPC Calibrated Conformance Standard Test Card**



**GS1-128 Calibrated Conformance Standard Test Card**

2. **EAN/UPC Calibration Cards:**
  - a. Choose the appropriate “Master Grade” barcode. The “EAN-13 Master Grade” code is used to calibrate systems in Europe. The “UPC-A Master Grade” code is used to calibrate systems within the United States.
  - b. Place the calibration card in the system’s field of view.
  - c. Choose one of the “Master Grade” barcodes and place it so the blue line goes through the middle of the “PASS” portion of the barcode.
  - d. Confirm that the “Goal” values in the software (on the “Setup” tab) match the values on the calibration card. If the values do not match, confirm that you have the correct calibration card for the LVS-95XX system serial number (located on system) that you are calibrating.
3. **GS1-128 Calibration Cards:** Larger fields of view require a “GS1-128” calibration card. Use the “PASS” portion of the GS1-128 barcode to calibrate your system.

## Q14. Is it acceptable if my calibration values measured do not match exactly, but calibration passes?

The ISO/IEC 15426 requirements for verifiers allows for a tolerance (+/- )


Parameter	Symbology Type	Tolerance
Rmax	Both	± 5% reflectance
Rmin	Both	± 3% reflectance
UEC	Both	± 0%
Decodability	Multi-row	± 8%
Defects	Multi-row	± 8%
Codeword Yield	Multi-row	± 8%
Grid Nonuniformity	Matrix	± 6%
Modulation	Matrix	± 8% of the value (Measured for the reduced dark window on a calibrated test symbol card)
Fixed Pattern Damage	Matrix	Within calibrated grade boundaries

## Q15. When does my calibration card expire?

Calibration cards expire two years from the issue date on your card. Please make sure that you keep current to avoid any audit findings. To replace your calibration card, contact [helpdesk@microscan.com](mailto:helpdesk@microscan.com).



## Q16. What are GS1 System Symbol Specification Tables?

 **IMPORTANT:** Microscan is providing training sessions to help you understand the new changes to the GS1 System Symbol Specification Tables and how they affect your organization.

- Training sessions are held the second Tuesday of each month at 10:00 a.m. EST/EDT (schedule permitting) and last approximately one hour. There will be a Q&A at the end of training for participants to ask questions.
- The sessions are conducted remotely using GoToMeeting's conferencing software ([www.gotomeeting.com](http://www.gotomeeting.com)).
- Unlimited number of participants allowed per organization
- To request a training session, please send an e-mail to [info@microscan.com](mailto:info@microscan.com).

To meet the evolving needs of data carriers and their use within the GS1 System, GS1 has updated the GS1 System Symbol Specification Tables within the "GS1 General Specifications" document.

Consideration should be given to how these changes affect barcode production and the maintenance of quality in the production process.

GS1 System Symbol Specification Tables are specified by GS1 for each application area, which include:


Table	Description
<b>Table 1</b>	Trade Items Scanned in General Retail POS and not General Distribution
<b>Table 2</b>	Trade Items Scanned in General Distribution Only
<b>Table 3</b>	Trade Items Scanned at General Retail POS and General Distribution
<b>Table 4</b>	Trade Items – Packages/Containers Not Scanned at POS or General Retail
<b>Table 5</b>	Trade Items Scanned in General Distribution that are Logistics Units
<b>Table 6</b>	Regulated Healthcare Non-Retail Consumer Trade Items Not Scanned in General Distribution
<b>Table 7</b>	Direct Part Marking
<b>Table 8</b>	Trade Items Scanned in Pharmacy (Retail or Non-Retail) and General Distribution
<b>Table 9</b>	GS1 Keys GDTI, GRAI, GIAI and GLN
<b>Table 10</b>	Regulated Healthcare Retail Consumer Trade Items Not Scanned in General Distribution
<b>Table 11</b>	GS1 GSRNs

The GS1 System Symbol Specification Tables contain the following information for each application, as defined in Section 5.5.2 of the "GS1 General Specifications" document (Version 15, Issue 2, Jan-2015):

### 5.5.2. Dimensional Specifications and Operational Requirements

Over the years, operational requirements of GS1 System users have influenced the dimensional specifications of GS1 System symbols, and these dimensional specifications have in turn influenced the development of scanning system optics and printing processes. The dimensional requirements for each application area defined in Section 2 are set out in the GS1 System Symbol Specification Tables (SSTs) (see Section 5.5.2.7). Each SST provides the following barcode specification detail:

- The barcode(s) specified by the GS1 System for each application area
- The minimum, target, and maximum X-dimension (narrow element width) for the symbol, based on the scanning environment
- The minimum and target barcode height, based on the scanning environment
- The Quiet Zone width and, for primary and secondary symbols, the minimum and maximum separation between the two symbols. (These measurements are expressed as multiples of the X-dimension in the form nX.)
- The minimum ISO quality specification expressed as **g.g/aa/www**, where **g.g** is the minimum overall symbol grade to one decimal place (on a 4.0 scale), **aa** is the effective measuring aperture in thousandths of an inch, and **www** is the wavelength of the light source in nanometres.

 **Note:** Please refer to Section 2 for any specific application standard (such as Section 2.1.2.4, Fixed Measure - Regulated Healthcare Retail Consumer Trade Items, and Section 2.1.5, Fixed Measure - Direct Part Marking) that may supplement or supersede these symbol specification tables for specific application areas.

Before determining the exact symbol specification required, additional factors, such as the scanning environment, SHALL be considered. These are summarised in Section [5.5.2.1](#).

The following pages provide additional information on the GS1 System Symbol Specification Tables and is taken directly from the “GS1 General Specifications” document (Version 15, Issue 2, Jan-2015).



**Note:** If an item is a General Retail Consumer Trade Item and Regulated Healthcare Retail Consumer Trade Item then the barcode marking for general retail is required at a minimum.

**Figure 5.5.2.6.1-3.** Summary of the Symbol Specification Tables per following Figure 5.5.2.6.1 - 2 GS1 Symbology Operational Environment Decision Tree

Symbol Spec. Tables	General Retail POS	Retail Pharmacy	* Non-Retail Pharmacy	Non-Retail Non-Healthcare	General Distribution	Direct Part Marking	Logistics Unit (SSCC)	GIAI, GRAI, GLN	GSRN
Table 1	Yes				No				
Table 2				Yes	Yes				
Table 3	Yes				Yes				
Table 4				Yes	No				
Table 5					Yes		Yes		
Table 6			Yes		No				
Table 7			Yes	Yes	No	Yes			
Table 8		Yes	Yes		Yes				
Table 9					No			Yes	
Table 10		Yes			No				
Table 11									Yes

\* Table 6 should be used for products scanned at bedside

### 5.5.2.7. GS1 System Symbol Specification Tables

In order to find the correct barcode specification, you must:

- Find the appropriate GS1 System application area using Figure 5.5.2.6 - 1.
- If the application area references two Symbol Specification Tables, use the decision tree in Figure 5.5.2.6.1 - 2 to determine which one to use.

Figure 5.5.2.7 - 1 provides a quick reference list of the symbol quality parameters depending on their type and their application.

**Figure 5.5.2.7-1.** Quick Reference on Symbol Quality

Symbology	Application or ID Key	ISO (ANSI) Symbol Grade	Aperture	Wavelength
EAN/UPC	GTIN-8	1.5 (C)	See Symbol Specification Tables 1, 2, 3, 4, 6, 8 and 10 for values	660 nm +/-10
EAN/UPC	GTIN-12	1.5 (C)	See Symbol Specification Tables 1, 2, 3, 4, 6, 8 and 10 for values	660 nm +/-10
EAN/UPC	GTIN-13	1.5 (C)	See Symbol Specification Tables 1, 2, 3, 4, 6, 8 and 10 for values	660 nm +/-10
GS1-128	GTIN-12, GTIN-13, GTIN-14	1.5 (C)	See Symbol Specification Tables 2, 4, 5, 6, 8, 9 and 10 for values	660 nm +/-10
GS1-128	SSCC	1.5 (C)	10 mils	660 nm +/-10

Symbology	Application or ID Key	ISO (ANSI) Symbol Grade	Aperture	Wavelength
ITF-14 (<0.635 mm (0.025 in.) X)	GTIN-12, GTIN-13, GTIN-14	1.5 (C)	See Symbol Specification Tables 2, 4, 6, 8, and 10 for values	660 nm +/-10
ITF-14 (≥0.635 mm (0.025 in.) X)	GTIN-12, GTIN-13, GTIN-14	0.5 (D)	20 mils	660 nm +/-10
Composite	GTIN-8, GTIN-12, GTIN-13, GTIN-14 and other AIs	1.5 (C)	6 mils	660 nm +/-10
GS1 DataBar	GTIN-8, GTIN-12, GTIN-13, GTIN-14 and other AIs	1.5 (C)	See Symbol Specification Tables 1, 2, 3, 4, 6, 8 and 10	660 nm +/-10
GS1 DataMatrix	Direct Part Marking, Regulated Healthcare Retail or Non-Retail Consumer Trade Items Extended Packaging	1.5 (C)	See Symbol Specification Tables 6, 7, 8, 9, 10 and 11 Table 1 Addendum for values.	660 nm +/-10
GS1 QR Code	Direct Part Marking, Custom Trade Item, Extended Packaging GDTI, and GSRN	1.5 (C)	See Symbol Specification Table 1 Addendum, 7, 9, and 11 for values.	660 nm +/-10



**Note:** An EAN/UPC-based symbol SHALL be verified using a 6 mils (0.006 inch) aperture, a 660 nanometres +/-10 nanometres wavelength of light, and requires a minimum symbol grade of 1.5 (overall symbol grade on a 4.0 scale) equivalent to a “C” under the ANSI X3.182 standard. In the Symbol Specification Tables that follow, as well as on a typical barcode purchase order, this is expressed as 1.5/06/660.

### 5.5.2.7.1. Symbol Specification Table 1 - Trade Items Scanned in General Retail POS and not General Distribution

Figure 5.5.2.7.1-1. GS1 System Symbol Specification Table 1

Primary Symbol(s) Specified	X-dimension mm (inches)			(**) Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	(*) Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
EAN-13	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	1.5/06/660
EAN-8	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	14.58 (0.574")	18.23 (0.718")	36.46 (1.435")	7X	7X	1.5/06/660
UPC-A	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	1.5/06/660
UPC-E	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	1.5/06/660
GS1 DataBar Omnidirectional (****)	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	12.14 (0.478")	15.19 (0.598")	30.36 (1.195")	None	None	1.5/06/660
GS1 DataBar Stacked Omnidirectional (****)	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	25.10 (0.988")	31.37 (1.235")	62.70 (2.469")	None	None	1.5/06/660
GS1 DataBar Expanded	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	8.99 (0.354")	11.23 (0.442")	22.44 (0.883")	None	None	1.5/06/660
GS1 DataBar Expanded Stacked (****)	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.75 (0.738")	23.44 (0.923")	46.86 (1.845")	None	None	1.5/06/660

Primary Symbol(s) Specified Plus Add-on 2 or 5	X-dimension mm (inches)			(**) Minimum Symbol Height for Given X mm (inches)			Quiet Zone	Min separation between symbols	Max separation between symbols	Quiet Zone	Min. Quality Spec.
	(*) Minimum	Target	Maximum	For Min. X-dimension	For Target X-dimension	For Max. X-dimension					
EAN-13 + 2	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	12X	5X	1.5/06/ 660
EAN-13 + 5	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	12X	5X	1.5/06/ 660
UPC-A + 2	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	12X	5X	1.5/06/ 660
UPC-A + 5	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	12X	5X	1.5/06/ 660
UPC-E + 2	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	12X	5X	1.5/06/ 660
UPC-E + 5	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	12X	5X	1.5/06/ 660

- (\*) These barcodes may only be printed using an X-dimension below 0.264 millimetre (0.0104 inch) or 80 percent magnification under the following conditions:
- The allowance for X-dimensions between 0.249 millimetre (0.0098 inch) or 75 percent magnification and 0.264 millimetre (0.0104 inch) or 80 percent magnification is only applicable to on demand (e.g., thermal, laser) print processes. For all other printing processes, an X-dimension of 0.264 millimetre (0.0104 inch) is attainable and is the minimum allowable size.
  - When printing a minimum symbol with any method of printing, the area provided for printing the symbol and the required Quiet Zone should never be less than the area required for an X-dimension of 0.264 millimetre (0.0104 inch).
  - When printing a minimum symbol with any method of printing, the symbol height SHALL never be truncated below the minimum.
- (\*\*) The minimum symbol height dimensions listed for all symbologies including EAN/UPC Symbols do not include the Human Readable Interpretation. The minimum heights of EAN/UPC Symbols do not include the extended bars: see Section 5.2.1.4.2 for dimensions of the extended bars. Because of the operative scanning environment for EAN/UPC Symbols, there is a direct relationship between the symbol's height and width. This means the minimum symbol height listed is tied to the minimum, target, and maximum X-dimension listed. There is no maximum for the height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Minimum Symbol Height column. For GS1 DataBar Expanded Stacked symbols, the table reflects the minimum symbol height for symbols that are two rows in height.
- (\*\*\*) In addition to the factors above related to digital printing, one other exception is permitted; For loose produce being weighed at the Point-of-Sale (POS) using GS1 DataBar Stacked Omnidirectional minimum X-dimension of 0.203 millimetre (0.0080 inch) is permitted but may produce scanning performance reduction. However, for POS, this performance drop off is not noticeable when the product must be weighed at the Point-of-Sale. Even with a slower scanning performance to conduct the transaction, the weighing process takes longer than the scanning process. For that reason, a lower minimum X-dimension should never be used on products crossing Point of Sale which are not weighed as loose produce during the scan event.
- (\*\*\*\*) The current symbol specification for GS1 DataBar Omni-directional (minimum height 33X) and GS1 DataBar Stacked Omni-directional (minimum height 69X) indicate a square aspect ratio for the symbol segments. To enhance scanning performance, in an omni-directional scanning environment, an over square aspect ratio shall be used following the example of the EAN/UPC symbology specification and rigorous field test of the GS1 DataBar symbology (46X or 95X).
- (\*\*\*\*\*) For North American Coupon Codes using GS1 DataBar Expanded Stacked in 2 row and 3 row configurations the X Dimension may be as low as 0.0080" (0.203mm) as long as a minimum overall bar height of 1.020" (25.91mm) is maintained. X-dimensions less than 0.0100" (.254mm) might not always be feasible for all GS1 DataBar Coupon barcodes due to variables, such as printing process, symbol orientation, and material. Due to the time sensitive nature of the coupon printing process, these variables should be considered during the design and barcode origination processes. Barcode verification should always be done from printing press proofs.



**Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.

In addition to the symbol used at general retail POS, an additional 2D symbol may be used to carry AI (8200). As AI (8200) has a mandatory association with GTIN, the GTIN within the symbol ensures compatibility with direct or indirect mode. GS1 DataMatrix is approved for all applications including regulated healthcare trade items covered by SSTs 6, 7, 8, and 10, but for general retail consumer trade items, either GS1 QR Code or GS1 DataMatrix are GS1 approved options. When using 2D symbols to carry AI (8200) on general retail trade items, the following specifications are required.

**Figure 5.5.2.7.1-2. GS1 System Symbol Specification Table 1 Addendum for AI (8200)**

Symbol(s) Specified (**)	X-dimension mm (inches)			Minimum Symbol Height for Given X mm (inches)			Quiet Zone	Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Surrounding Symbol	
GS1 DataMatrix (ECC 200) (*)	0.396 (0.0150")	0.495 (0.0195")	0.743 (0.0293")	Height is determined by X-dimension for Data that is encoded			1X on all four sides	1.5/12/660
GS1 QR Code (*)	0.396 (0.0150")	0.495 (0.0195")	0.743 (0.0293")	Height is determined by X-dimension for Data that is encoded			4X on all four sides	1.5/12/660

- |                        |  |
|------------------------|--|
| <p>(*)</p> <p>(**)</p> | <p>2D X-dimension - Optical effects in the image capture process require that the GS1 DataMatrix and GS1 QR Code Symbols be printed at 1.5 times the equivalent X-dimension allowed for linear symbols.</p> <p>Where a linear symbol appears on the package, reverse and mirror-image representation of GS1 2D symbols shall not be permitted.</p> |
|------------------------|--|

### 5.5.2.7.2. Symbol Specification Table 2 - Trade Items Scanned in General Distribution Only

Figure 5.5.2.7.2-1. GS1 System Symbol Specification Table 2

Symbol(s) Specified	(*) X-dimension mm (inches)			(**) Minimum Symbol Height for Given X mm (inches)			Quiet Zone		(***) Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
EAN-13	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.28 (1.350")	45.70 (1.800")	45.70 (1.800")	11X	7X	1.5/10/660
EAN-8	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	27.35 (1.077")	36.46 (1.435")	36.46 (1.435")	7X	7X	1.5/10/660
UPC-A	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.28 (1.350")	45.70 (1.800")	45.70 (1.800")	9X	9X	1.5/10/660
UPC-E	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.28 (1.350")	45.70 (1.800")	45.70 (1.800")	9X	7X	1.5/10/660
ITF-14	0.495 (0.0195")	0.495 (0.0195")	1.016 (0.0400")	31.75 (1.250")	31.75 (1.250")	31.75 (1.250")	10X	10X	1.5/10/660
GS1-128	0.495 (0.0195")	0.495 (0.0195")	1.016 (0.0400")	31.75 (1.250")	31.75 (1.250")	31.75 (1.250")	10X	10X	1.5/10/660
GS1 DataBar Omnidirectional	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	16.34 (0.644")	21.78 (0.858")	21.78 (0.858")	NA	NA	1.5/10/660
GS1 DataBar Stacked Omnidirectional	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.16 (1.346")	45.54 (1.794")	45.54 (1.794")	NA	NA	1.5/10/660
GS1 DataBar Expanded	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	16.83 (0.663")	22.44 (0.884")	22.44 (0.884")	NA	NA	1.5/10/660
GS1 DataBar Expanded Stacked	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	35.15 (1.385")	46.86 (1.846")	46.86 (1.846")	NA	NA	1.5/10/660
GS1 DataBar Stacked	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	6.44 (0.254")	8.58 (0.338")	8.58 (0.338")	NA	NA	1.5/10/660
GS1 DataBar Limited	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	4.95 (0.195")	6.60 (0.260")	6.60 (0.260")	NA	NA	1.5/10/660
GS1 DataBar Truncated	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	6.44 (0.254")	8.58 (0.338")	8.58 (0.338")	NA	NA	1.5/10/660

(\*) UPC-E and EAN-8 Symbols are designed for use on small packages. Whenever space permits, UPC-A, EAN-13, ITF-14, or GS1-128 Symbols should be used in the General Distribution Scanning environment.

The minimum symbol height dimensions listed for all symbologies including EAN/UPC Symbols do not include the Human Readable Interpretation (or Bearer Bars for ITF-14 Symbols). The minimum heights of EAN/UPC Symbols do not include the extended bars: see Section 5.2.1.4.2 for dimensions of the extended bars. Because of the operative scanning environment for EAN/UPC Symbols, there is a direct relationship between the symbol's height and width. This means the minimum symbol height is tied to the minimum, target, and maximum X-dimension listed.

ITF-14 Symbols with X-dimensions below 0.635 millimetre (0.0250 inch) should not be printed directly on corrugate with conventional (plate-based) processes. Packages and/or containers marked with ITF-14 Symbols with X-dimensions between 1.016 millimetres (0.0400 inch) and 1.219 millimetres (0.048 inch) are acceptable based on historical specifications, but a migration to the 1.016 millimetres (0.0400 inch) maximum X-dimension should be made on new artwork. The ITF-14 Symbol's bar width ratio target is 2.5:1, and the acceptable range is 2.25:1 to 3:1.



GS1-128 Symbols have a maximum symbol length of 165.10 millimetres (6.500 inch), which may impact the maximum achievable X-dimension. For example, a GS1-128 Symbol containing an SSCC has a maximum achievable X-dimension for 0.940 millimetre (0.0370 inch)

- (\*\*) The minimum symbol height for General Distribution Scanning is always 31.75 millimetres (1.250 inch). The minimum symbol height dimensions for ITF-14 and GS1-128 Symbols relate to the bar heights only (do not include Human Readable Interpretation text or ITF-14 Symbol Bearer Bars). There is no maximum for the height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Minimum Symbol Height column.
- (\*\*\*) For ITF-14 Symbols printed on labels with off-set, thermal, or laser print with an X-dimension 0.495 millimetre (0.0195 inch), the minimum quality specification is 1.5/10/660. For ITF-14 Symbols printed directly on corrugate or labels with an X-dimension greater than or equal to 0.635 millimetre (0.0250 inch), the minimum quality specification is 0.5/20/660.



**Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.

### 5.5.2.7.3. Symbol Specification Table 3 - Trade Items scanned at General Retail POS and General Distribution

Figure 5.5.2.7.3-1. GS1 System Symbol Specification Table 3

Symbol(s) Specified	(*) X-dimension mm (inches)			(**) Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
EAN-13	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.28 (1.350")	45.70 (1.800")	45.70 (1.800")	11X	7X	1.5/06/660
EAN-8	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	27.35 (1.077")	36.46 (1.435")	36.46 (1.435")	7X	7X	1.5/06/660
UPC-A	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.28 (1.350")	45.70 (1.800")	45.70 (1.800")	9X	9X	1.5/06/660
UPC-E	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.28 (1.350")	45.70 (1.800")	45.70 (1.800")	9X	7X	1.5/06/660
GS1 DataBar Omnidirectional (***)	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	22.77 (0.897")	30.36 (1.196")	30.36 (1.196")	None	None	1.5/06/660
GS1 DataBar Stacked Omnidirectional (***)	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	47.03 (1.853")	62.70 (2.470")	62.70 (2.470")	None	None	1.5/06/660
GS1 DataBar Expanded	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	16.83 (0.663")	22.44 (0.884")	22.44 (0.884")	None	None	1.5/06/660
GS1 DataBar Expanded Stacked	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	35.15 (1.385")	46.86 (1.846")	46.86 (1.846")	None	None	1.5/06/660

(\*) UPC-E and EAN-8 Symbols are designed for use on small packages. Whenever space permits, UPC-A and EAN-13 Symbols should be used.

(\*\*) The minimum symbol height dimensions listed for all symbologies including EAN/UPC Symbols do not include the Human Readable Interpretation. The minimum heights of EAN/UPC Symbols do not include the extended bars: see Section 5.2.1.4.2 for dimensions of the extended bars. Because of the operative scanning environment for EAN/UPC Symbols, there is a direct relationship between the symbol's height and width. This means the minimum symbol height listed is tied to the minimum, target, and maximum X-dimension listed. There is no maximum for the height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Minimum Symbol Height column.

(\*\*\*) The current symbol specification for GS1 DataBar Omni-directional (minimum height 33X) and GS1 DataBar Stacked Omni-directional (minimum height 69X) indicate a square aspect ratio for the symbol segments. To enhance scanning performance, in an omni-directional scanning environment, an over square aspect ratio shall be used following the example of the EAN/UPC symbology specification and rigorous field test of the GS1 DataBar symbology (46X or 95X).



**Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.

**5.5.2.7.4. Symbol Specification Table 4 – Trade Items – Packages/Containers Not Scanned at POS or General Retail - Also not scanned in General Distribution or Regulated Healthcare (retail or non-retail)**

**Figure 5.5.2.7.4-1. GS1 System Symbol Specification Table 4**

Symbol(s) Specified	(*) X-dimension mm (inches)			(**) Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
EAN-13	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	1.5/06/660
EAN-8	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	14.58 (0.574")	18.23 (0.718")	36.46 (1.435")	7X	7X	1.5/06/660
UPC-A	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	1.5/06/660
UPC-E	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	1.5/06/660
GS1 DataBar Omnidirectional	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	8.71 (0.343")	10.90 (0.429")	21.78 (0.858")	NA	NA	1.5/06/660
GS1 DataBar Stacked Omnidirectional	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.24 (0.718")	27.78 (0.897")	45.54 (1.794")	NA	NA	1.5/06/660
GS1 DataBar Expanded	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	8.99 (0.354")	11.23 (0.442")	22.44 (0.883")	NA	NA	1.5/06/660
GS1 DataBar Expanded Stacked	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.75 (0.738")	23.44 (0.923")	46.86 (1.845")	NA	NA	1.5/06/660
GS1 DataBar Stacked	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	3.43 (0.135")	4.29 (0.169")	8.58 (0.338")	N/A	N/A	1.5/06/660
GS1 DataBar Limited	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	2.64 (0.104")	3.30 (0.130")	6.60 (0.260")	N/A	N/A	1.5/06/660
GS1 DataBar Truncated	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	3.43 (0.135")	4.29 (0.169")	8.58 (0.338")	N/A	N/A	1.5/06/660
ITF-14	0.250 (0.00984")	0.495 (0.0195")	0.495 (0.0195")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660
GS1- 128	0.250 (0.00984")	0.495 (0.0195")	0.495 (0.0195")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660

(\*) ITF-14 Symbols with X-dimensions below 0.635 millimetre (0.0250 inch) should not be printed directly on corrugate with conventional (plate based) processes. Packages and/or containers marked with ITF-14 Symbols with X-dimensions between 1.016 millimetres (0.0400 inch) and 1.219 millimetres (0.0480 inch) are acceptable based on historical specifications, but a migration to the 1.016 millimetre (0.0400 inch) maximum X-dimension should be made on new artwork. The ITF-14 Symbol's bar width ratio target is 2.5:1, and the acceptable range is 2.25:1 to 3:1.

Section 5.5.3.4 gives full details on when barcodes can be printed at less than the minimum X-dimension. In general, barcodes may only be printed using an X-dimension below 0.264 millimetre (0.0104 inch) or 80 percent magnification under the following conditions:

- The allowance for X-dimensions between 0.249 millimetre (0.0098 inch) or 75 percent magnification and 0.264 millimetre (0.0104 inch) or 80 percent magnification is only applicable to on demand (e.g., thermal, laser) print processes. For all other printing processes, an X-dimension of 0.264 millimetre (0.0104 inch) is attainable and is the minimum allowable size.
- When printing a minimum symbol with any method of printing, the area provided for printing the symbol and the required Quiet Zone should never be less than the area required for an X-dimension of 0.264 millimetre (0.0104 inch).

■ When printing a minimum symbol with any method of printing, the symbol height SHALL never be truncated.

(\*\*) The minimum symbol height dimensions listed for all symbologies including EAN/UPC Symbols do not include the Human Readable Interpretation (or Bearer Bars for ITF-14 Symbols), The minimum heights of EAN/UPC Symbols do not include the extended bars: see Section 5.2.1.4.2 for dimensions of the extended bars.

Because of the operative scanning environment for EAN/UPC Symbols, there is a direct relationship between the symbol's height and width. This means the minimum symbol height listed is tied to the minimum, target, and maximum X-dimension listed.

The minimum bar height for ITF-14 and GS1-128 Symbols in this operative scanning environment is 12.70 millimetres (0.500 inch), but if the package is physically too small to accommodate this rule, further truncation is permitted. In no case shall the bar height be less than 5.08 millimetres (0.200 inch).

There is no maximum for the symbol height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Minimum Symbol Height column.

Whereas, linear symbol heights are set at a fixed dimension, Composite Components are printed at the same X-dimension as the linear portion of the Composite Symbology, and the barcode height varies depending on the amount of data, the X-dimension, and which linear symbol is used in conjunction with the Composite Component. Note that Composite Components have to be printed with a linear symbol such as GS1 DataBar, GS1-128, UPC-A, or EAN-13. ITF-14 cannot be used with Composite Components.

**Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.

### 5.5.2.7.5. Symbol Specification Table 5 – Trade Items scanned in General Distribution that are Logistics Units

Figure 5.5.2.7.5-1. GS1 System Symbol Specification Table 5

Symbol(s) Specified	(*) X-dimension mm (inches)			(**) Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
GS1-128	0.495 (0.0195")	0.495 (0.0195")	0.940 (0.0370")	31.75 (1.250")	31.75 (1.250")	31.75 (1.250")	10X	10X	1.5/10/660

(\*) If the item is too small to accommodate the minimum X-dimension, the minimum X-dimension is 0.250 millimetre (0.0098 inch).

(\*\*) The minimum symbol height indicated is for bar height only and does not include the Human Readable Interpretation. If the item is too small to accommodate the minimum, the minimum bar height is the greater of 15 percent of the symbol width including Quiet Zones or 12.70 millimetres (0.500 inch). If the package is physically too small to accommodate this rule, further truncation is permitted, but in no case shall the bar height be less than 5.08 millimetres (0.200 inch).

There is no maximum for the height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Minimum Symbol Height column.

**Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.

### 5.5.2.7.6. Symbol Specification Table 6 - Regulated Healthcare Non-Retail Consumer Trade Items Not Scanned in General Distribution

Figure 5.5.2.7.6-1. GS1 System Symbol Specification Table 6

Symbol(s) Specified	X-dimension mm (inches)			Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
GS1- 128	0.170 (0.0067")	0.495 (0.0195")	0.495 (0.0195")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660
GS1 DataMatrix (ECC 200) (*)	0.255 (0.0100")	0.380 (0.0150")	0.495 (0.0195")	Height is determined by X-dimension for Data that is encoded			1X on all four sides		1.5/08/660
GS1 DataBar Omnidirectional	0.170 (0.0067")	0.200 (0.0080")	0.660 (0.0260")	5.61 (0.221")	6.60 (0.260")	21.78 (0.858")	<i>Not Applicable</i>	<i>Not Applicable</i>	1.5/06/660
GS1 DataBar Truncated	0.170 (0.0067")	0.200 (0.0080")	0.660 (0.0260")	2.21 (0.087")	2.60 (0.102")	8.58 (0.338")	<i>Not Applicable</i>	<i>Not Applicable</i>	1.5/06/660
GS1 DataBar Stacked	0.170 (0.0067")	0.200 (0.0080")	0.660 (0.0260")	2.21 (0.087")	2.60 (0.102")	8.58 (0.338")	<i>Not Applicable</i>	<i>Not Applicable</i>	1.5/06/660
GS1 DataBar Stacked Omnidirectional	0.170 (0.0067")	0.200 (0.0080")	0.660 (0.0260")	11.73 (0.462")	13.80 (0.543")	45.54 (1.794")	<i>Not Applicable</i>	<i>Not Applicable</i>	1.5/06/660
GS1 DataBar Limited	0.170 (0.0067")	0.200 (0.0080")	0.660 (0.0260")	1.70 (0.067")	2.00 (0.079")	6.60 (0.260")	<i>Not Applicable</i>	<i>Not Applicable</i>	1.5/06/660
GS1 DataBar Expanded	0.170 (0.0067")	0.200 (0.0080")	0.660 (0.0260")	5.78 (0.228")	6.80 (0.268")	22.44 (0.884")	<i>Not Applicable</i>	<i>Not Applicable</i>	1.5/06/660
GS1 DataBar Expanded Stacked	0.170 (0.0067")	0.200 (0.0080")	0.660 (0.0260")	12.07 (0.475")	14.20 (0.559")	46.86 (1.846")	<i>Not Applicable</i>	<i>Not Applicable</i>	1.5/06/660
EAN-13	0.170 (0.0067")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	1.5/06/660
EAN-8	0.170 (0.0067")	0.330 (0.0130")	0.660 (0.0260")	14.58 (0.574")	18.23 (0.718")	36.46 (1.435")	7X	7X	1.5/06/660
UPC-A	0.170 (0.0067")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	1.5/06/660
UPC-E	0.170 (0.0067")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	1.5/06/660
ITF-14	0.170 (0.0067")	0.495 (0.0195")	0.495 (0.0195")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660
CC-A	All CCs need to be printed at the same X-dimensions as their linear components, therefore consult the appropriate row and column for the linear symbol to be used.			Height is determined by X-dimension for data that is encoded			1X	1X	1.5/06/660
CC-B							1X	1X	1.5/06/660
CC-C							2X	2X	1.5/06/660

(\*) 2D X-dimension - Optical effects in the image capture process require that the GS1 DataMatrix symbol be printed at 1.5 times the equivalent printing X-dimension allowed for linear or Composite Symbols.



**Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.



**Note:** This table contains several symbol options. All are permitted to promote backward compatibility, but Section 2 Application Standards define which symbols are the preferred options for the future.

### 5.5.2.7.7. Symbol Specification Table 7 - Direct Part Marking

Figure 5.5.2.7.7-1. GS1 System Symbol Specification Table 7

Symbol(s) Specified	X-dimension mm (inches) Note 1 Note 6			Minimum Symbol Height for Given X mm (inches)	Quiet Zone	Minimum Quality Specification	
	Minimum	Target	Maximum				
GS1 DataMatrix	0.254(0.0100")	0.300 (0.0118")	0.615 (0.0242")	Height is determined by X-dimension for data that is encoded	1X on all four sides	1.5/06/660 <b>Note 5</b>	For Direct Marking of items other than Medical devices
GS1 QR Code	0.254 (0.0100")	0.300 (0.0118")	0.615 (0.0242")	Height is determined by X-dimension for data that is encoded	4X on all four sides	1.5/06/660	For Direct Marking of items other than Medical devices
GS1 DataMatrix Ink Based Direct Part Marking	0.254 (0.0100")	0.300 (0.0118")	0.615 (0.0242")	Height is determined by X-dimension for data that is encoded	1X on all four sides	1.5/08/660 <b>Note 5</b>	For Direct Marking of Medical devices such as Small Medical / Surgical Instruments
GS1 DataMatrix Direct Part Marking - A <b>Note 2</b>	0.100 (0.0039")	0.200 (0.0079")	0.300 (0.0118")	Height is determined by X-dimension for data that is encoded	1X on all four sides	1.5/03/ <b>Note 3</b> <b>Note 4 Note 5</b>	For Direct Marking of Medical devices such as Small Medical / Surgical Instruments
GS1 DataMatrix Direct Part Marking - B <b>Note 2</b>	0.200 (0.0079")	0.300 (0.0118")	0.495 (0.0195")	Height is determined by X-dimension for data that is encoded	1X on all four sides	1.5/06/ <b>Note 3</b> <b>Note 4 Note 5</b>	For Direct Marking of Small Medical / Surgical Instruments

**Note 1:** Optical effects in the image capture process require that label based GS1 DataMatrix and GS1 QR Code symbols be printed at approximately 1.5 times the equivalent X-dimension allowed for linear symbols in the same application.


**Note 2:** There are two basic types of non ink based Direct Part Marks, those with “connected modules” in the “L” shaped finder pattern (GS1 DataMatrix Direct Part Marking – A) created by DPM marking technologies such as laser or chemical etching and those with “non connected modules” in the “L” shaped finder pattern (GS1 DataMatrix Direct Part Marking – B) created by DPM marking technologies such as dot peen. Due to the marking technologies and characteristics of reading they each have varied ranges of X-dimensions and different quality criteria recommended and may require different reading equipment.


GS1 DataMatrix – A is suggested for marking of medical devices such as small medical / surgical instruments. The Minimum X-dimension of 0.100mm is based upon the specific need for permanence in direct marking of small medical instruments which have limited marking area available on the instrument with a target useable area of 2.5mm x 2.5mm and a data content of GTIN (AI 01) plus Serial Number (AI 21).


**Note 3:** The wavelength for Direct Part Marked GS1 DataMatrix and GS1 QR Code is based upon the practical scanning environment and thus must in the grade be matched to the scanner / imagers being used. See *ISO/IEC 15415* and *ISO/IEC 29158*.

**Note 4:** The angle is an additional parameter defining the angle of incidence (relative to the plane of the symbol) of the illumination for Direct Part Marking verification. It shall be

included in the overall symbol grade when the angle of incidence is other than 45 degrees. Its absence indicates that the angle of incidence is 45 degrees. See *ISO/IEC 15415* and *ISO/IEC 29158*.


 **Note 5:** The effective aperture for GS1 DataMatrix and GS1 QR Code quality measurements should be taken at 80 percent of the minimum X-dimension allowed for the application. For Direct Part Marking - A this would equate to an aperture of 3; for Direct Part Marking – B this would equate to an aperture of 6 and for general healthcare label printing, an aperture of 8. See *ISO/IEC 15415* and *ISO/IEC 29158*.

 **Note 6:** The largest X-dimension in a given range that will allow a symbol with the needed data content to fit within the available marking area should be used to maximize marking and reading performance (depth of field, tolerance to curvature, etc.).

 **Note 7:** In practical application, where very small symbol sizes are needed, it may be necessary to work with GS1 DataMatrix module X-dimensions smaller than those 2342 suggested. Where dimensional restrictions prohibit the application of a full size code, reduced x-dimension AIDC marking is encouraged to facilitate information capture. It should be noted that these practices may limit the symbol effectiveness, including but not limited to:

- the effect of smaller X-dimensions on reading performance,
- the need for, and limited availability of, special scanners/imagers for reading,
- special processes for marking,
- the overall cost considerations.

These smaller X-dimensions should therefore only be used internally or by mutual agreement between trading partners

 **Note:** In small instrument marking, mixed marking technologies used within the same scanning environment should be avoided to ensure highest reading performance. Laser etching is recommended for small instrument marking.

### 5.5.2.7.8. Symbol Specification Table 8 - Trade Items Scanned in Retail Pharmacy and General Distribution or Non-Retail Pharmacy and General Distribution


Figure 5.5.2.7.8-1. GS1 System Symbol Specification Table 8

Symbol(s) Specified	X-dimension mm (inches)			Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
GS1- 128	0.495 (0.0195")	0.495 (0.0195")	1.016 (0.0400")	31.75 (1.250")	31.75 (1.250")	31.75 (1.250")	10X	10X	1.5/10/660
GS1 DataMatrix (ECC 200) (*)	0.750 (0.0300")	0.750 (0.0300")	1.520 (0.0600")	Height is determined by X-dimension for Data that is encoded			1X on all four sides		1.5/20/660
EAN-13	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.28 (1.350")	45.70 (1.800")	45.70 (1.800")	11X	7X	1.5/10/660
EAN-8	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	27.35 (1.077")	36.46 (1.435")	36.46 (1.435")	7X	7X	1.5/10/660
UPC-A	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.28 (1.350")	45.70 (1.800")	45.70 (1.800")	9X	9X	1.5/10/660
UPC-E	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.28 (1.350")	45.70 (1.800")	45.70 (1.800")	9X	7X	1.5/10/660
ITF-14	0.495 (0.0195")	0.495 (0.0195")	1.016 (0.0400")	31.75 (1.250")	31.75 (1.250")	31.75 (1.250")	10X	10X	1.5/10/660
GS1 DataBar Omnidirectional	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	16.34 (0.644")	21.78 (0.858")	21.78 (0.858")	Not Applicable	Not Applicable	1.5/10/660
GS1 DataBar Truncated	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	6.44 (0.254")	8.58 (0.338")	8.58 (0.338")	Not Applicable	Not Applicable	1.5/10/660
GS1 DataBar Stacked	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	6.44 (0.254")	8.58 (0.338")	8.58 (0.338")	Not Applicable	Not Applicable	1.5/10/660
GS1 DataBar Stacked Omnidirectional	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	34.16 (1.346")	45.54 (1.794")	45.54 (1.794")	Not Applicable	Not Applicable	1.5/10/660
GS1 DataBar Limited	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	4.95 (0.195")	6.60 (0.260")	6.60 (0.260")	Not Applicable	Not Applicable	1.5/10/660
GS1 DataBar Expanded	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	16.83 (0.663")	22.44 (0.884")	22.44 (0.884")	Not Applicable	Not Applicable	1.5/10/660
GS1 DataBar Expanded Stacked	0.495 (0.0195")	0.660 (0.0260")	0.660 (0.0260")	35.15 (1.385")	46.86 (1.846")	46.86 (1.846")	Not Applicable	Not Applicable	1.5/10/660
CC-A	All CCs need to be printed at the same X-dimensions as their linear components, therefore consult the appropriate row and column for the linear symbol to be used.			Height is determined by X-dimension for data that is encoded			1X	1X	1.5/06/660
CC-B							1X	1X	1.5/06/660
CC-C							2X	2X	1.5/06/660

(\*) 2D X-dimension - Optical effects in the image capture process require that the GS1 DataMatrix and GS1 QR Code symbols be printed at 1.5 times the equivalent printing X-dimension allowed for linear symbols.

- Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.
- Note:** This table contains several symbol options. All are permitted to promote backward compatibility, but Section 2 Application Standards define which symbols are the preferred options for the future.




 **Note:** Since June 2007 GS1 has recommended all trading partners in the healthcare sector invest exclusively in imaging-based scanners. Now that GS1 DataMatrix has been approved within the standard, it is important to inform all trading partners of a process within GS1 to establish target deployment dates. Without these dates, brand owners do not have a way know when to deploy GS1 DataMatrix on their packaging and those needing to invest in scanning equipment may inadvertently purchase equipment that will not support the standards. To see GS1 Healthcare’s Position Paper on GS1 DataMatrix adoption, visit <http://www.gs1.org/healthcare>.


### 5.5.2.7.9. Symbol Specification Table 9 - GS1 Keys GDTI, GRAI, GIAI and GLN

Figure 5.5.2.7.9-1. GS1 System Symbol Specification Table 9

Symbol(s) Specified	X-dimensions mm(inches)			Minimum Symbol Height for Given X mm(inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
GS1- 128	0.250 (0.0098")	0.250 (0.0098")	0.495 (0.0195")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660
GS1 DataMatrix (ECC 200) (*)	0.380 (0.0150")	0.380 (0.0150")	0.495 (0.0195")	Height is determined by X-dimension for Data that is encoded			1X on all four sides		1.5/08/660
GS1 QR Code (*)	0.380 (0.0150")	0.380 (0.0150")	0.495 (0.0195")	Height is determined by X-dimension for Data that is encoded			4X on all four sides		1.5/08/660

(\*) 2D X-dimension - Optical effects in the image capture process require that the GS1 DataMatrix and GS1 QR Code symbols be printed at 1.5 times the equivalent printing X-dimension allowed for linear symbols.

 **Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.

 **Note:** This table contains several symbol options. All are permitted to promote backward compatibility, but Section 2 Application Standards define which symbols are the preferred options for the future.

### 5.5.2.7.10. Symbol Specification Table 10 – Regulated Healthcare Retail Consumer Trade Items Not Scanned in General Distribution

Figure 5.5.2.7.10-1. GS1 System Symbol Specification Table 10

Symbol(s) Specified	X-dimension mm (inches)			Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
GS1- 128	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660
GS1 DataMatrix (ECC 200) (*)	0.396 (0.0156")	0.495 (0.0195")	0.990 (0.0390")	Height is determined by X-dimension for Data that is encoded			1X on all four sides		1.5/08/660
GS1 DataBar Omnidirectional	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	8.71 (0.343")	10.89 (0.429")	21.78 (0.858)	Not Applicable	Not Applicable	1.5/06/660
GS1 DataBar Truncated	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	3.43 (0.135")	4.29 (0.169")	8.58 (0.338")	Not Applicable	Not Applicable	1.5/06/660
GS1 DataBar Stacked	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	3.43 (0.135")	4.29 (0.169")	8.58 (0.338")	Not Applicable	Not Applicable	1.5/06/660
GS1 DataBar Stacked Omnidirectional	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.22 (0.718")	27.77 (0.897")	45.54 (1.794")	Not Applicable	Not Applicable	1.5/06/660
GS1 DataBar Limited	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	2.64 (0.104")	3.30 (0.130")	6.60 (0.260")	Not Applicable	Not Applicable	1.5/06/660
GS1 DataBar Expanded	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	8.98 (0.354")	11.22 (0.442")	22.44 (0.883")	Not Applicable	Not Applicable	1.5/06/660
GS1 DataBar Expanded Stacked	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.74 (0.738")	23.43 (0.923")	46.86 (1.846")	Not Applicable	Not Applicable	1.5/06/660
EAN-13	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	1.5/06/660
EAN-8	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	14.58 (0.574")	18.23 (0.718")	36.46 (1.435")	7X	7X	1.5/06/660
UPC-A	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	1.5/06/660
UPC-E	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	1.5/06/660
ITF-14	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660
CC-A	All CCs need to be printed at the same X- dimensions as their linear components, therefore consult the appropriate row and column for the linear symbol to be used.			Height is determined by X-dimension for data that is encoded			1X	1X	1.5/06/660
CC-B							1X	1X	1.5/06/660
CC-C							2X	2X	1.5/06/660

(\*) 2D X-dimension - Optical effects in the image capture process require that the GS1 DataMatrix and GS1 QR Code symbols be printed at 1.5 times the equivalent printing X-dimension allowed for linear symbols.



**Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.



**Note:** Since June 2007 GS1 has recommended all trading partners in the healthcare sector invest exclusively in imaging-based scanners. Now that GS1 DataMatrix has been

approved within the standard, it is important to inform all trading partners of a process within GS1 to establish target deployment dates. Without these dates, brand owners do not have a way know when to deploy GS1 DataMatrix on their packaging and those needing to invest in scanning equipment may inadvertently purchase equipment that will not support the standards. To see GS1 Healthcare’s Position Paper on GS1 DataMatrix adoption, visit [GS1.org/GS1Healthcare](http://GS1.org/GS1Healthcare).

### 5.5.2.7.11. Symbol Specification Table 11 – GS1 GSRNs

Figure 5.5.2.7.11-1. GS1 System Symbol Specification Table 11

Symbol(s) Specified	X-dimensions mm(inches)			Minimum Symbol Height for Given X mm(inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X-dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
GS1- 128	0.170 (0.0067")	0.250 (0.0098")	0.495 (0.0195")	12.70 (0.500")	12.70 (0.500")	12.70 (0.500")	10X	10X	1.5/06/660
GS1 DataMatrix (ECC 200) (*)	0.255 (0.0100")	0.380 (0.0150")	0.495 (0.0195")	Height is determined by X-dimension for Data that is encoded			1X on all four sides		1.5/08/660
GS1 QR Code (*)	0.255 (0.0100")	0.380 (0.0150")	0.495 (0.0195")	Height is determined by X-dimension for Data that is encoded			4X on all four sides		1.5/08/660

(\*) 2D X-dimension - Optical effects in the image capture process require that the GS1 DataMatrix and GS1 QR Code symbols be printed at 1.5 times the equivalent printing X-dimension allowed for linear symbols.

- ✔ **Note:** See Section [5.5.2.6](#) to ensure the correct Symbol Specification Table is used.
- ✔ **Note:** This table contains several symbol options. All are permitted to promote backward compatibility, but Section 2 Application Standards define which symbols are the preferred options for the future.

### 5.5.3. Barcode Production

The following subsections will:

- Provide background on major barcode printing methods and materials
- Provide general printing and packaging background for major application groups

The various definitions and specialist terms used throughout this section are found in *ISO/IEC 15419, Information Technology, Automatic Identification and Data Capture Techniques, Bar Code Digital Imaging and Printing Performance Testing*, *ISO/IEC 15416, Information technology, Automatic Identification and Data Capture Technologies, Bar Code Print Quality Test Specification – Linear Symbols* and *ISO/IEC 15415, Information technology, Automatic Identification and Data capture Techniques, Bar Code Print Quality Test Specification, Two-dimensional Symbols*.