

Life Science Barcoding Fundamentals

Microplate Labeler Reference



Agilent Technologies

Notices

© Agilent Technologies, Inc. 2010

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

User Guide Part Number

G5404-90004

February 2010

Contact Information

Agilent Technologies Inc.
Automation Solutions
5301 Stevens Creek Blvd.
Santa Clara, CA 95051
USA

Technical Support: 1.800.979.4811
or +1.408.345.8011
service.automation@agilent.com

Customer Service: 1.866.428.9811
or +1.408.345.8356
orders.automation@agilent.com

European Service: +44 (0)1763853638
euroservice.automation@agilent.com

Documentation feedback:
documentation.automation@agilent.com

Web:
www.agilent.com/lifesciences/automation

Acknowledgements

Microsoft and Windows are registered trademarks of the Microsoft Corporation in the United States and other countries.

Adobe and Acrobat are trademarks of Adobe Systems Incorporated.

Warranty

The material contained in this document is provided “as is,” and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or sub-contract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14

(June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Safety Notices

 A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

Contents

About this guide	1
Microplate labeling tips	2
Labware selection guidelines	2
Label placement	3
Media kits	3
FAQs—Life science barcoding fundamentals	4
Label content	4
Label format design	5
Label design parameters	6
Quiet zones and other blank margins for barcodes	8
Barcode height	9
Symbologies for life science applications	9
Fonts for human-readable fields	10
FAQs—Agilent G5404B Microplate Labeler	11
Label example	11
Label with clear synthetic backing versus paper backing	11
Wider gaps in the label media	11
Skipped labels	12
Spliced label rolls	12
Clear-backed labels on old platform (G5404A)	12
Label sizes	12
Label durability	13
Matte versus glossy labels	13
Colored labels	13
Barcode reader option	13
Non-Agilent barcode readers	14
On-demand versus prelabeled microplates	14
Hand-applied labels	15
Using a data source to supply label content	15
User adjustments	15
Multiple Microplate Labeler devices	16
Third-party software and ActiveX controls	16
Lab site requirements	16
Application Support	16
Templates for barcode label formats overview	17
Template 1—Code 128 over small text field	18
Template 2—Code 128 barcode only	20
Template 3—Single large text field only	21
Template 4—Big text field and Code 128	22
Template 5—Four small text fields	24

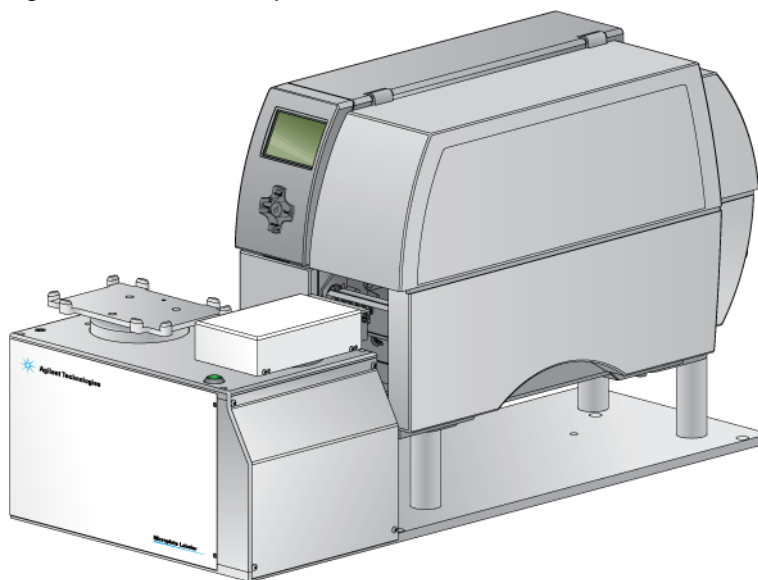
Contents

Template 6—Data Matrix symbology with large text field	26
Template 7—Data Matrix symbology with two small text fields	28
Template 8—PDF 417 symbology over medium-size text field	30
Template 9—PDF 417 symbology over small text field	32
Request for Microplate Labeler applications support	35

About this guide

The Agilent G5404B Microplate Labeler automatically prints and applies labels to microplates for identification. This guide provides tips on selecting label-friendly labware for the Microplate Labeler, and answers to frequently asked questions about the Microplate Labeler and labeling for life science applications.

Figure 1 G5404B Microplate Labeler



Use this guide to supplement the following guides:

- *G5404B Microplate Labeler User Guide*
- *Microplate Labeler Consumables Selection Guide*

You can search the Automation Solutions online knowledge base or download the latest version of a PDF file from the Agilent Technologies website at www.agilent.com/lifesciences/automation.



Microplate labeling tips

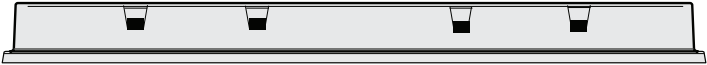
You can get the best labeling performance from the Microplate Labeler if you use automation- and labeling-friendly labware. The labeling quality depends on many factors:

- *Labware selection.* Microplate material and design contribute to how well a label adheres to the side of a microplate.
- *Label placement.* The position of the label on the microplate can affect label adhesion and whether a barcode reader can scan the barcode.
- *Media selection.* The quality of the adhesive labels determines how well the Microplate Labeler can pick-and-apply a label. The ribbon and label also play a big role in how successful readers will be in decoding the symbology and the ability of the label to withstand exposure to chemicals and temperature and humidity extremes.
- *Label format design.* The label design must meet certain criteria to ensure the readability by barcode readers and humans.

This section describes labware selection, label placement, and media. See the subsequent sections for answers to questions about label format design.

Labware selection guidelines

Use only microplates that meet ANSI Standards ANSI/SBS 1-2004 through ANSI/SBS 4-2004. Evaluate the make and model of all your microplates to ensure consistent results for all application conditions.

Criteria	Guidelines
Microplate design	Avoid microplates with features that can interfere with label placement and adhesion. The following designs are poor choices because the label can be taller than the microplate's available vertical surface for label placement. Applying labels to an uneven surface, for example overlapping the edge of a microplate skirt, results in problems with label adhesion. • Excessively high, raised skirts. • Mid-plate structural features, such as raised surfaces on the sides.  • No skirt or half-skirted microplates, such as PCR plates. Such microplates may also be incompatible with the Microplate Labeler plate stage. Holes in the sides in the microplate sides can reduce adhesion of the label. Holes can also be challenging for robotic grippers. 

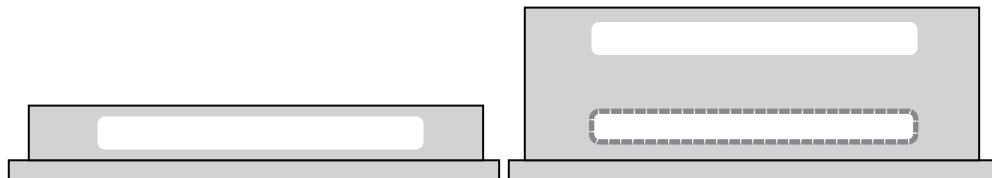
Criteria	Guidelines
Microplate material	The Microplate Labeler is designed for compatibility with labware that features plasticized surfaces, such as polypropylene or polystyrene. For the best results, apply the adhesive labels to labware that is: • Dry and at room temperature. • Clean and has not been subjected to liquids or powders that can reduce or prevent adhesion of the labels. • Not warped. Warped microplates can hamper the device's ability to repeatably place labels at the same position on all microplates within a run.

Label placement

The Microplate Labeler is designed to place the labels as follows:

- Centered horizontally (left to right) on one of any of the four sides of a microplate.
- At either of two vertical positions on the microplate. This feature accommodates the labware of varying sizes or that have different skirt heights.

Figure 2 Examples of label positions on different size labware



On microplates with tall skirts, labels may be placed on the skirt, but should be evaluated for compatibility with the application.

Media kits

New consumables have been developed along with the new G5404B Microplate Labeler. The consumables are conveniently packaged in media kits that contain:

- Roll of labels and equivalent roll of thermal transfer ribbon
Two sizes of adhesive label rolls are available (6,500 or 13,000 labels). The kit contains a matching amount of ribbon to image the full roll of labels so that the user can replace both the labels and ribbons at the same time. The labels are on a synthetic clear backing, which reduces the generation of particulates.
- Empty ribbon core for winding used ribbon
- Isopropyl alcohol cleaning pen for cleaning the printhead and print roller before loading new media

FAQs—Life science barcoding fundamentals

This section addresses frequently asked questions (FAQs) about microplate labeling.

Label content

Q

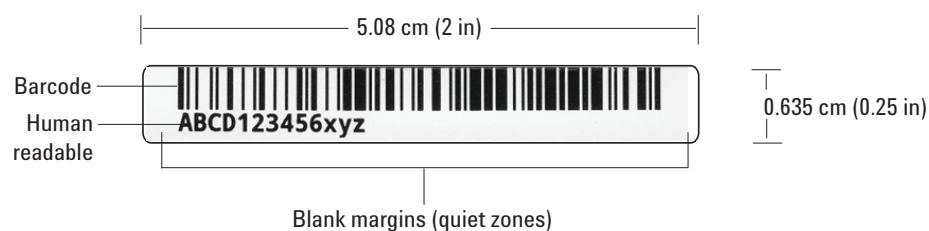
This is my first time to use barcodes for microplate labeling. What should I put on my labels?

A

Agilent Technologies recommends using the minimum number of numeric or alphanumeric characters required to uniquely identify the microplate.

Barcodes are a convenient way to encode data that can be read rapidly by electronic readers. Barcodes are typically used with a database application. The data encoded in the barcode is used as an index to a record in the database, which contains more detailed information about the samples in the scanned microplate. We recommend that you include the same data as a human-readable text field.

Figure 3 Label with data encoded in a Code 128 barcode and as human-readable text



See the next question for our label designs that are the most popular.

Label format design

Q

Can you help me design an ideal barcode label?

A

Yes. We have a set of predesigned label formats (templates) that are ready for you to use. These templates are preloaded in the Microplate Labeler printer and installed with the software. To see the most popular of these predesigned templates, refer to the figures in the next question.

For more label design templates, see “[Templates for barcode label formats overview](#)” on page 17. You can also go to the online knowledge base and access the *G5404B Microplate Labeler User Guide*. To access the knowledge base or download a PDF of a user guide, go to www.agilent.com/lifesciences/automation, and click the **Knowledge Base** link.

Q

What are the most commonly used label formats for microplates?

A

The four most common label designs, starting with the most popular, are as follows. These are just a few of the designs that are provided as ready-to-use templates on the Microplate Labeler.

Design option	Label example and description
1	Label with Code 128 symbology above a small-font text field  In this design, the barcode spans the length of the label to optimize data capacity and readability by a barcode reader, while also providing space for a human-readable text field.
2	Label with a large-font text field next to Code 128 symbology  For applications where less data is required, this design provides the best readability for barcode readers and humans in one label. The data can include up to 10 numerals or 6 alpha characters, maximum.

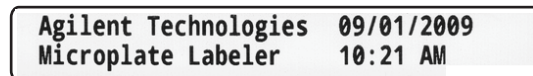
Design option	Label example and description
------------------	-------------------------------

- 3** Two different labels to be applied on the same microplate: Code 128 symbology, barcode-only label paired with a human-readable, text-only label



For the ultimate in machine and human readability, you can use two different labels on each microplate. For example, the barcode-only label might go on the north side of the microplate, and the human-readable label might go on the west side.

-
- 4** Label with four small text fields



This option can also serve as a second label to add more human-readable information to a microplate that already has a barcode label.

Label design parameters

Q

Are we limited to the label format designs in the Agilent templates, or can we design our own label formats for the Microplate Labeler?

A

You can design your own label formats using the Label Editor feature in the device software. For details on how to use the Label Editor, you can go to our online knowledge base and search the *G5404B Microplate Labeler User Guide*. To access the knowledge base or download a PDF of a user guide, go to www.agilent.com/lifesciences/automation, and click the **Knowledge Base** link.

Q

What should I consider if I choose to design my own label formats for the Microplate Labeler?

A

When designing a new label format, consider the following parameters:

- *Symbology encoding characteristics.* Which characters does the symbology encode, for example, alphanumeric or numeric? What is the data density of the symbology? For instance, the Code 128 symbology can encode more data in the same space than the Code 39 symbology.
- *Symbology size attributes.* What size settings will you use for the narrow-bar width and the height of the bars in the barcode? What will the length and height of the barcode be?

Smaller size attributes allow greater data density but decrease the readability of the symbol. In general, a 0.25 mm (0.01 in) narrow bar width offers very good readability. A narrow bar width smaller than 0.17 mm (0.067 in) will be very hard to read and should not be used.

- *Font type and size for human-readable text.* The Agilent templates use the Droid Mono Bold font, which Agilent Technologies recommends for most applications. The font size depends on the size of the other fields on the label. For example, the label in the following figure uses a 6-point font.



- *Proportions of fields on the label.* Increasing the size of the barcode symbol will improve readability of the symbol but reduce the amount of space left for other fields on the label. The figure above shows a label where the barcode fills approximately 80% of the label area, while the human-readable field fills approximately 20% of the label area.
- *Blank margins or white space (quiet zones).* At each end of the barcode, use quiet zones to isolate the barcode from potentially interfering graphics and to enhance machine readability. The required size of the quiet zone can vary depending on the symbology. For example, the minimum quiet zone for Code 128 is 10 times the width of the narrowest bar or space in the barcode. In general, you should allow a 3.81 mm (0.15-inch) margin on both the right and left sides of a linear symbol to accommodate quiet zones and other factors.

Quiet zones and other blank margins for barcodes

Q

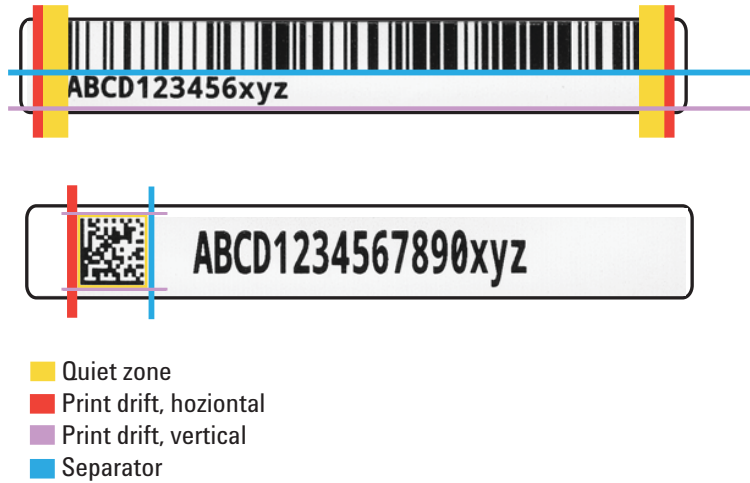
In addition to quiet zones, should the design include other blank margins?

A

The label design should include the following blank margins:

- *Quiet zones.* The barcode symbology requires quiet zones on each end to facilitate machine readability. (See the previous question.)
- *Print drift allowance.* Include blank space to compensate for horizontal and vertical drift between the print and the edges of the label, for example, as a result of the label media shifting relative to the printhead. The vertical print drift should be no more than ±0.25 mm (0.01 in), and the horizontal print drift should be no more than ±0.75 mm (0.03 in).
- *Separator between fields.* Although no print drift occurs between two fields, allow for some blank space between fields to facilitate readability.

Figure 4 Minimum blank margins for Code 128 (top) and Data Matrix (bottom) symbologies



At a minimum, the required margin sizes on these two label designs are:

Parameter	1D Code 128 symbology	2D Data Matrix symbology
Quiet zone	Required on each end: 2.5 mm (0.1 in) 10 * narrow bar width, where, narrow bar width = 0.25 mm (0.01 in)	Required on all sides: 0.30 mm (0.0117 in) 1 * module width, where, Module width (dot size) = 0.30 mm (0.0117 in)
Print drift allowance, horizontal	On each end of the quiet zone: 0.76 mm (0.03 in)	On each end of the side quiet zones: 0.76 mm (0.03 in)
Print drift allowance, vertical	Below bottom field on label: 0.25 mm (0.01 in)	Above and below the top and bottom quiet zones: 0.25 mm (0.01 in)
Separator between fields	0.25 mm (0.01 in)	2.5 mm (0.1 in)

The Data Matrix symbology requires quiet zones on all sides of the barcode. The Data Matrix symbology features an L-shaped finder pattern on the left and bottom sides that serves to locate the start of the symbology, and a timing pattern (opposite the L shape) to indicate the symbology end for a barcode reader.

Barcode height

Q

I have seen labels with linear barcodes that extend from the top to the bottom edges of the label. Is it okay if the image bleeds off the top or bottom of the label?

A

Yes, both Microplate Labeler models (G5404A or G5404B) can print this type of label. Any printed image that extends beyond the edge of the label would be applied to the label backing, not the transport rollers. So, no additional cleaning of the printer would be required. Also, no quiet zone is required above or below a linear barcode for readability.

Symbologies for life science applications

Q

Which barcode symbologies are practical for life-science applications? Which symbology is the best?

A

The following table shows example labels with symbologies that are well-suited to life-science applications. These examples illustrate the symbology variations in data density and space requirements.

Barcode symbology	Example labels printed on the Microplate Labeler
Code 128 (1D)	 An example label with a Code 128 (1D) barcode. The barcode is a standard linear barcode. Below the barcode, the text "ABCD123456xyz" is printed.
PDF417 (2D)	 An example label with a PDF417 (2D) barcode. The barcode is a stacked 1D barcode. Below the barcode, the text "ABCD1234567890xyz" is printed.
Data Matrix (2D)	 An example label with a Data Matrix (2D) barcode. The barcode is a square 2D barcode. Below the barcode, the text "ABCD1234567890xyz" is printed.

Approximately 90% of Agilent Microplate Labeler customers use the Code 128 symbology, and most barcode readers can read Code 128.

Note: Code 3 of 9 or Code 39 (not shown) was commonly used in the past and is still used by legacy barcode readers. But Code 3 of 9 is not as compressed as Code 128, so a longer barcode is required to represent the same data.

Q

Some labs use the high-density 2D Data Matrix symbology to fit more data on a label. Should I be using a 2D symbology?

A

The G5404B Microplate Labeler can generate labels that have 2D barcodes. The greater data density of the 2D symbologies can be leveraged to fit more data on the label or to leave more space on the label for human-readable fields. However, most lab automation customers do not require the 2D capability. Also, the barcode readers that are capable of decoding 2D symbologies are much less common in automation equipment than the readers that can decode 1D symbologies. Be sure to verify that your barcode reader can decode the symbology that you want to use.

Most customers find the 1D Code 128 symbology well-suited for their labeling requirements. The label should contain the least amount of information necessary to create a unique label for the microplate. Any additional information can be accessed in a database. In cases where additional content is required on the actual microplate labels, you can use up to four labels, one on each side of the microplate.

Fonts for human-readable fields

Q

Why does the Microplate Labeler have so many font (typeface) choices? What are the advantages of one font over another?

A

Unlike choosing a font in your word-processing software, where attractive style may be a priority, readability is critical on the small barcode labels. Not only is it important to fit a limited amount of information on a small label, the printed characters must be very clear and easy to discern. Clarity of the characters is critical in alphanumeric strings where mistakes can be serious.

The Microplate Labeler offers some traditional industry-standard fonts as well as contemporary fonts that are ideal for life-science microplate labeling applications. See the next question for more details.

Q

Which font is best for microplate labels?

A

Agilent Technologies recommends the Droid Mono Bold font for small microplate labels featuring human-readable text. The Droid Mono Bold font is featured in the label design templates that are provided with the Microplate Labeler software. Here is an example showing some of the characters:

00 11 22 55

This font is sans serif and features monospaced characters to enhance readability. In the example, you can see that the numerals are simple and clean, and the zero has a crossbar. The Microplate Labeler also features a non-bold (regular) version of the font.

FAQs—Agilent G5404B Microplate Labeler

This section provides answers to frequently asked questions (FAQs) more specific to the G5404B Microplate Labeler.

Label example

Q

What does an actual label look which has been printed on the Agilent Microplate Labeler?

A

This label is an example printed by the G5404B Microplate Labeler, which has a 600-dpi printer resolution.



See the previous sections for other examples of labels printed by the Microplate Labeler.

Label with clear synthetic backing versus paper backing

Q

Why do the labels for the G5404B Microplate Labeler feature a clear synthetic backing?

A

The synthetic backing on the labels provides two distinct advantages resulting in increased reliability and walkaway time:

- 1 *Enhanced performance.* The clear synthetic backing enables better positioning for printing and facilitates label separation for picking labels from the backing.
- 2 *Fewer particulates.* The clear synthetic backing is much better than paper for applications that require optimal cleanliness. Using this type of label backing reduces the frequency of routine printer maintenance.

Wider gaps in the label media

Q

Why are the labels spaced farther apart on the clear synthetic backing than on paper backing?

A

Enhanced positional accuracy. The larger gap between each label eliminates the need for the printer to backfeed and results in good tension at all times for optimum print and presentation alignment.

Skipped labels

Q

Why does the original Microplate Labeler (G5404A) periodically skip labels? Will the new G5404B Microplate Labeler skip labels?

A

Because of the mechanical challenges in consistently achieving the tolerances for label die cuts, an occasional label can be more difficult to remove from the backing. The new G5404B Microplate Labeler features improved labels with better precision and repeatability in the die cutting. But, even the new Microplate Labeler can occasionally skip labels. However, the software has a retry option, which enables the device to pick a difficult label in most cases.

Spliced label rolls

Q

We received a roll of adhesive labels with a splice in it. Is it okay to use a spliced roll?

A

Up to two splices per roll is acceptable and has essentially no effect on the labeling performance.

Clear-backed labels on old platform (G5404A)

Q

Can we use the clear synthetic-backed labels on our older G5404A Microplate Labeler? Is there any advantage to doing so?

A

The clear synthetic-backed labels have not been tested on the G5404A Microplate Labeler. Therefore, Agilent Technologies cannot recommend settings to facilitate the use of these labels on the old platform.

Label sizes

Q

Does the Microplate Labeler use only the 0.635-cm by 5.08-cm (0.25-in by 2-in) labels? Can I use larger or smaller labels also?

A

Both Microplate Labeler models (G5404A and G5404B) are designed for the 0.635-cm by 5.08-cm (0.25-in by 2-in) labels. Alternative label sizes might result in reduced performance, such as a higher incidence of skipped labels, reduced label placement precision, or failure to pick and apply the label.

Label durability

Q

Will exposure to solvents or freezing temperatures (–20 °C) cause the label image to degrade or cause the label to fall off the microplate?

A

The Microplate Labeler uses labels that are compatible with most common laboratory solvents, including DMSO and alcohols, as well as temperatures down to –80 °C.

See the *Microplate Labeler Consumables Selection Guide* for details on the Microplate Labeler Media Kit. You can download the PDF file of this guide from the Agilent Technologies website at www.agilent.com/lifesciences/automation.

Matte versus glossy labels

Q

Does a matte or glossy finish on the labels provide more reliable barcode reads?

A

The data available for the barcoding industry indicate that barcodes printed on either a matte or glossy label can be read reliably. The labels for the new G5404B Microplate Labeler have a white matte finish and have performed successfully in life-science applications. The labels for the original G5404A Microplate Labeler have a white glossy finish and have been used successfully since the year 2000.

Colored labels

Q

Are colored labels an option for the Microplate Labeler?

A

Not at this time. Colored labels have been known to affect machine readability and the ink used for the color might affect chemical resistance.

Barcode reader option

Q

Why would I want to get the linear (1D) barcode reader option?

A

Agilent Technologies strongly recommends the use of a barcode reader to verify barcode legibility. Approximately 50% of the Microplate Labeler devices are sold with an Agilent barcode reader. The three most common applications include:

- 1 *Barcode verification.* Ensuring that the barcode can be scanned by a barcode reader and that the barcode is correct. Approximately 80% of Agilent microplate barcode readers are used for barcode verification.

- 2 *Associative barcoding.* Printing one microplate's barcode based on a source microplate's barcode. Some users add a prefix or suffix based on a source microplate's barcode or perform a database lookup to print a new barcode based on a pre-existing barcode.
- 3 *Barcode cloning.* Commonly used with liquid handlers for source microplate association.

Non-Agilent barcode readers

Q

Can I use my own barcode reader with the Microplate Labeler?

A

Options for barcode readers include:

- *Agilent-integrated barcode reader option mounted on the Microplate Labeler.* This is a convenient and proven solution that includes a compact, integrated mounting arm and a custom cable designed to integrate with the Microplate Labeler electronics for communication directly with the Agilent hardware and software.

This configuration includes a verification feature that enable the Microplate Labeler to print and apply a second label on top of the first label if the verification fails on the first label. The following two configurations cannot take advantage of this verification feature.

- *Agilent-integrated barcode reader mounted on the workstation or system.* Barcode readers can be mounted on other devices within Agilent Technologies lab automation systems and workstations. The device electronics for these barcode readers enable communication directly with the Agilent Technologies hardware and software.
- *Standalone customer-supplied barcode reader.* A third-party barcode reader may be connected to the host computer that runs the Microplate Labeler. But the third-party barcode reader cannot be directly integrated with the Microplate Labeler electronics and required communication settings.

If the recommended label designs are used, the Microplate Labeler will print barcodes that are readable by virtually all barcode readers. Use of the Agilent-integrated barcode readers ensures the highest levels of performance, compatibility and support.

On-demand versus prelabeled microplates

Q

What are the advantages of on-demand microplate labeling versus prelabeled microplates from a microplate manufacturer?

A

Using the Microplate Labeler to perform automated on-demand labeling has the following advantages over using prelabeled microplates:

- *Convenience.* You can create a unique series of labels up to the start of a run, including adding human-readable information, such as a time-date stamp or operator name.
- *Flexibility.* You are not bound to an inflexible sequence of numbers, and you may repeat or clone barcodes.

- *Shareability.* Label content can be custom tailored so that it is relevant to a collaborator's or customer's requirements (even for a single microplate). The use of customizable human-readable text enables the exchange of sample plates with those that may not have access to a shared database.

Hand-applied labels

Q

We have had our first Microplate Labeler (G5404A) for about five years now. Occasionally, someone from another lab discovers we have an automated microplate labeler and walks in asking for a series of a dozen labels they can print and take back to their lab to apply manually. Is the G5404B Microplate Labeler more compatible with hand labeling?

A

Like the G5404A, the new G5404B Microplate Labeler is designed to print and apply labels automatically. Although a series of labels can be printed without being applied to microplates, it is inconvenient to open up the printer to retrieve the strip of printed labels. However, when paired with the PlateTag software, both Microplate Labeler models offer a convenient solution to print and apply labels onto microplates that you manually place on the Microplate Labeler plate stage.

Using a data source to supply label content

Q

Will your software retrieve the label content from a data source?

A

Yes. The software for the Microplate Labeler can retrieve data from comma-separated value (CSV) or tab-delimited text files (TXT). The text file must be formatted as a matrix of rows and columns, where,

- The top row is reserved for naming the columns.
- Each subsequent row contains data for a single barcode label.
- Each column holds the data for one field in the barcode label.

User adjustments

Q

Our existing G5404A Microplate Labeler is about 5 years old, and we are considering an upgrade to the new G5404B Microplate Labeler. Our existing device required occasional adjustments to settings, such as Top of Form and Skip Distance. How often are these adjustments required on the new platform?

A

The G5404B Microplate Labeler should not require the printer alignment adjustments. On the original G5404A Microplate Labeler, occasional drift in the label presentation point would necessitate adjustments. The new G5404B Microplate Labeler resolves this issue.

Multiple Microplate Labeler devices

Q

Can I use the VWorks software to run both the G5404A (original) and G5404B Microplate Labeler in a single workstation or system?

A

Yes, as long as you use a version of the VWorks software that incorporates the driver for the new G5404B Microplate Labeler. Each Microplate Labeler device must have its own profile in the software.

Third-party software and ActiveX controls

Q

Did your ActiveX software change for the new G5404B Microplate Labeler? As a lab automation integrator, we purchase the Microplate Labeler for resale within other lab automation systems. We supply our own system software, but we use your ActiveX software to control the Microplate Labeler.

A

Yes, the ActiveX control has changed and now enables a choice of Microplate Labeler models (G5404A and G5404B). However, the command set that a programmer would use is essentially identical.

Lab site requirements

Q

What are the site requirements for operating a G5404B Microplate Labeler?

A

The primary device requirements are:

- *Environmental conditions.* 5 to 40 °C, 10 to 90% relative humidity, non-condensing.
- *Electrical requirements.* 100–240~, 50–60 Hz, 2.75 A
- *Compressed air requirements.* Clean, dry air, 1.2 Lps at 0.55 MPa (2.5 cfm at 80 psi)

Application Support

Q

We have additional questions and want help with our applications. How can we request help?

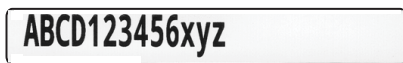
A

To help expedite your support request, you can complete and submit the [Request for Microplate Labeler Applications Support](#).

You can also go to our online knowledge base and search the *G5404B Microplate Labeler User Guide*. To access the knowledge base or download a PDF of a user guide, go to www.agilent.com/lifesciences/automation, and click the **Knowledge Base** link.

Templates for barcode label formats overview

The Agilent G5404B Microplate Labeler includes a set of predefined label formats that are ready to use for experimentation, training, or to fast-track a new application. The software also contains a Label Editor so you can design other label formats using the full range of symbologies available with the device.

Template	Printed image	Description
1		Code 128 over small text field. Our top recommendation for most microplate applications provides an optimized blend of data density, machine readability, and human readability.
2		Code 128 barcode only. Provides the best machine readability. You can pair this label with a second label to add human-readable text, for example, template 3 or 5.
3		Single large text field only. Provides maximum legibility of human-readable text. You can pair this label with a barcode-only label, for example, template 2.
4		Big text field and Code 128. Provides the best machine readability and human readability in a single label for those with smaller amounts of data (10 numerals or 6 alpha characters, maximum).
5		Four small text fields. Provides useful amount of human-readable information that can be added to a microplate that already has a barcode label.
6		Data Matrix with large text field. Provides Data Matrix version of template 1. The 2D symbology allows space for a much larger text field than that in template 1.
7		Data Matrix with two small text fields. Leverages the data density of 2D Data Matrix symbology to encode a large amount of data.
8		PDF 417 over medium-size text field. Provides 2D symbology in a format similar to templates 1 and 6 but with slightly more data capacity.
9		PDF 417 over small text field. Provides the data density and shape of 2D PDF 417 symbology to encode the largest amount of data on a label this size.

Note: Make sure that the barcode reader is capable of decoding the chosen barcode symbology before making a final choice in label format. The 2D symbologies (Templates 6-9) require a barcode reader that is capable of imaging instead of scanning. Most lab automation equipment will have more difficulty handling 2D symbologies than the 1D symbologies. But, if you have a 2D reader, you can realize some advantages. For example, the greater data density in the symbology allows for more data on a single label or for bigger text fields to be paired with similar amounts of data.

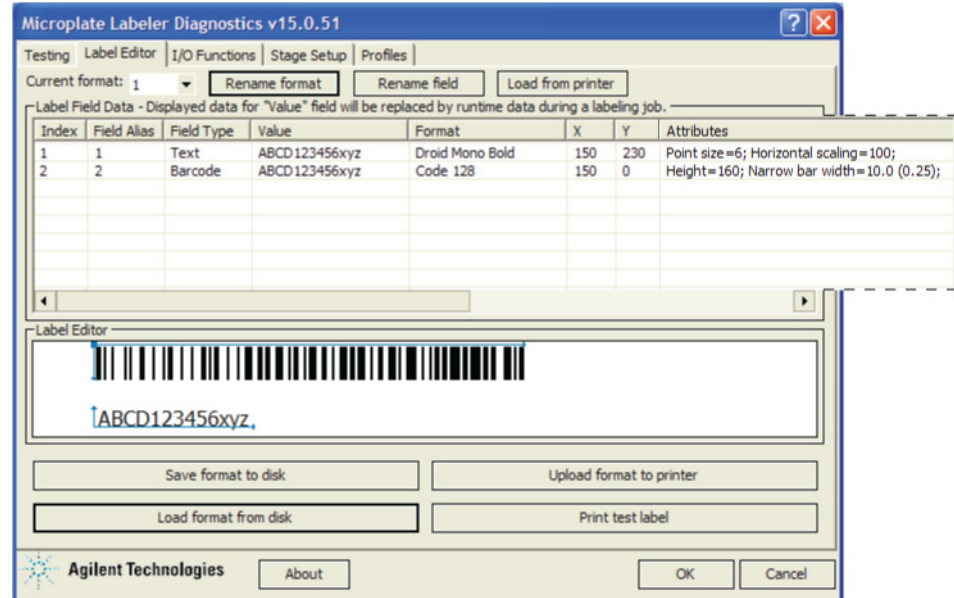
Note: Although these templates are not directly compatible with the previous model Microplate Labeler (G5404A), similar formats can be recreated for the G5404A model. Contact Automation Solutions Technical Support for assistance.

Template 1—Code 128 over small text field

Example label



Label Editor parameters and preview



Overview

Template 1 is our top format recommendation for a microplate label. The 1D Code 128 symbology offers reasonable data capacity and can be read by a great range of readers. A barcode that stretches the length of the label allows maximum data capacity for the label size. The text field underneath the barcode can be used to repeat the barcode data as human-readable text for verification, or for other notes or data in addition to the barcode.

Specs for symbology

Maximum data: 24 numerals or 12 alpha characters (The maximum alphanumeric length depends on the character mix.)

Note: Higher data density for numerals is achieved because they are encoded in pairs. So, a number with 23 numerals will not fit.

Design features

- Code 128 symbology is very common and offers good data density for this size label.
- The narrow bar width gives good readability and accommodates a good amount of data.
- The left blank margin is 1.27-mm (0.05-in) wider than the minimum required quiet zone of 10 times the narrow bar width.

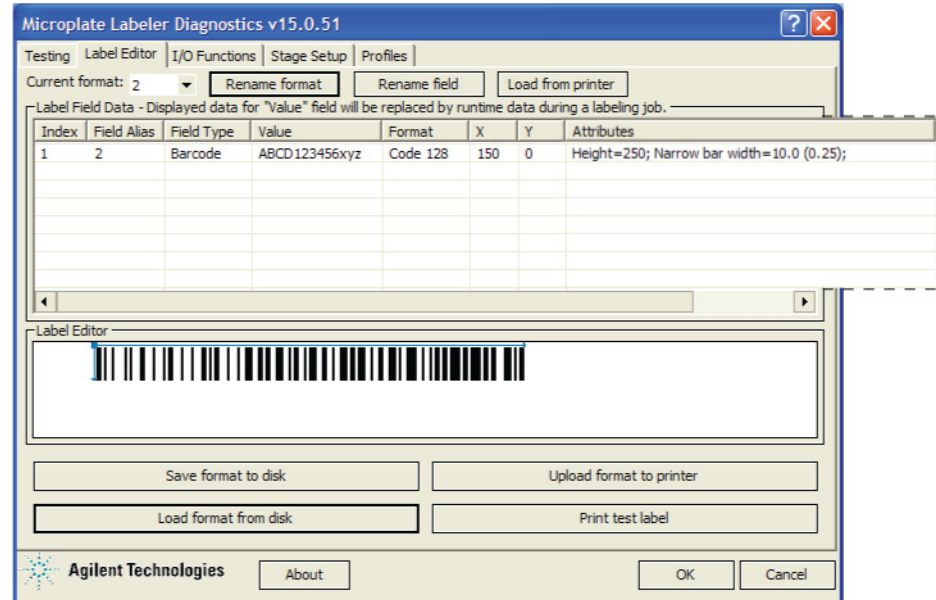
- The blank margin to the right of the barcode will fluctuate in size with the amount of data encoded. The example shows the maximum length barcode while still maintaining a 3.81-mm (0.15-in) right margin.
- The barcode extends to the top of label to maximize use of precious vertical space. The barcode height offers reasonable vertical redundancy to facilitate machine readability, and still allows room for a text field that is legible.
- Minimal space separates the barcode and the text field.
- The Droid Mono Bold font offers consistent character spacing, discernible and attractive characters. The font is small to allow maximum space for the barcode, while still providing legible text.
- The text field is left-justified to allow longer strings to fit on the label.
- A 0.51-mm (0.02-in) blank margin below the text allows for some vertical drift in the printing.

Template 2—Code 128 barcode only

Example label



Label Editor parameters and preview



Overview

If barcode readability is the primary objective, the best solution is to use all the available label space for the barcode. This barcode-only label can be paired with a text-only label, such as Template 3.

Specs

Maximum data: 24 numerals or 12 alpha characters (The maximum alphanumeric length depends on the character mix.)

Note: Higher data density for numerals is achieved because they are encoded in pairs. So, a number with 23 numerals will not fit.

Design features

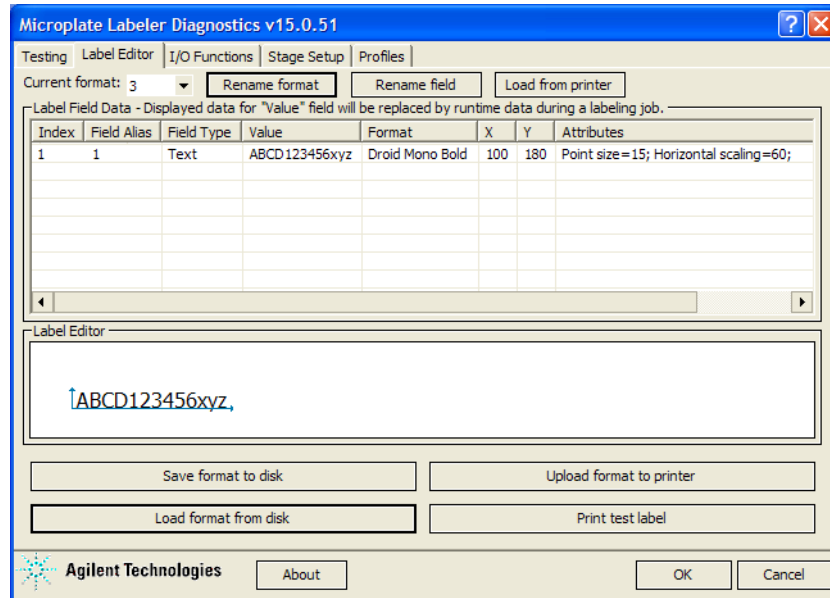
- Code 128 symbology is very common and offers good data density for this size label.
- The narrow bar width gives good readability and accommodates a good amount of data.
- The left blank margin is 1.27-mm (0.05-in) wider than the minimum required quiet zone of 10 times the narrow bar width.
- The blank margin to the right of the barcode will vary depending on the amount of data encoded. The example shows the maximum length barcode while still maintaining a 3.81-mm (0.15-in) right margin.
- The barcode extends to the top of label to maximize use of precious vertical space.

Template 3—Single large text field only

Example label



Label Editor parameters and preview



Overview

If maximum legibility of text is the primary objective, the best solution is to use all of the available space on the label for the text. This text-only label format is designed to be paired with the barcode-only label in Template 2.

Specs

Maximum data: 24 characters, any type

Design features

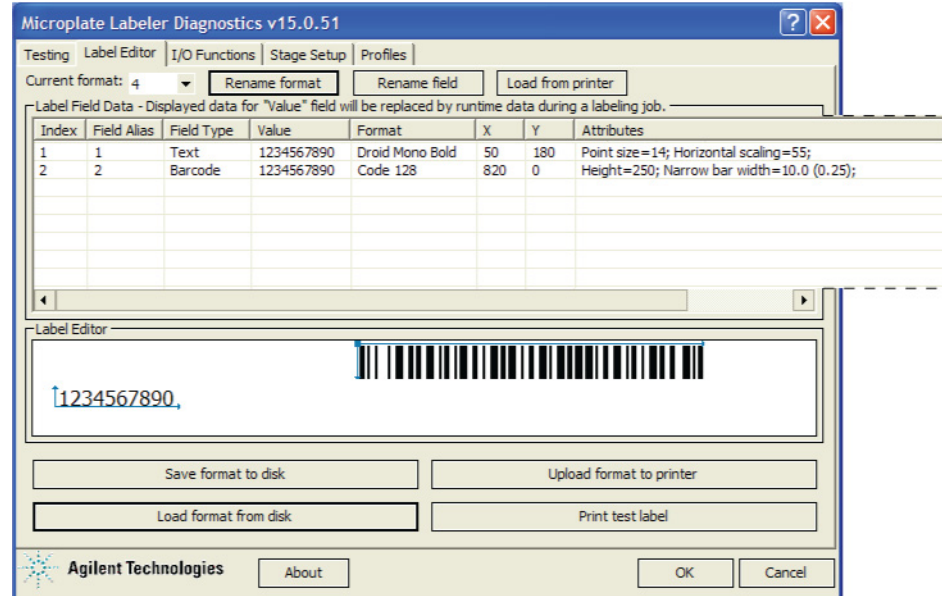
- The Droid Mono Bold font offers consistent character spacing, discernible characters, and a modern, attractive look.
- The text height is maximized within the height of the label.
- A blank margin above the text allows for 0.76-mm (0.030-in) vertical print drift.
- A blank margin below the text allows room for lowercase descenders, such as g or q, while also providing allowance for vertical print drift.
- The generous left margin allows for horizontal print drift. The print drift specification is ± 0.76 -mm (± 0.030 -in) for positioning the edge of the label to the edge of the label backing.
- The size of the right margin varies depending on the number of characters.
- The horizontal scaling of the text field squeezes enough characters onto the label to match the maximum data encoded in the barcode on the Template 2 label.

Template 4—Big text field and Code 128

Example label



Label Editor parameters and preview



Overview

For those who are using only a small amount of data, this format combines a large text field and a large barcode on a single label. The small amount of data can be encoded with maximum readability for both barcode and human readable text.

Specs

Maximum data: 10 numerals or 6 alpha characters (The maximum alphanumeric length depends on the character mix.)

Design features

- Code 128 symbology is very common and offers good data density for this size label.
- Narrow bar width gives good readability and accommodates a good amount of data.
- The blank margin to the right of the barcode will fluctuate in size with the amount of data encoded. The example shows the maximum length barcode while still maintaining a 3.81-mm (0.15-in) right margin.
- The barcode extends from top to bottom to maximize vertical redundancy, which facilitates machine readability.
- Minimal space separates the barcode and the text.

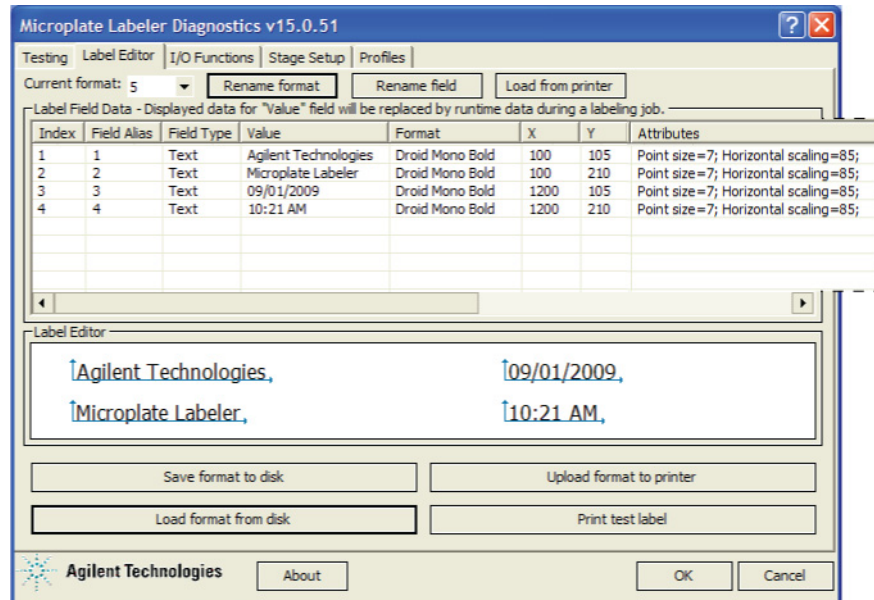
- The blank margin separating the text field and the barcode is 0.64-mm (0.025-in) wider than the minimum quiet zone required for machine readability.
- The Droid Mono Bold font offers consistent character spacing, discernible characters, and a modern, attractive look.
- The text height is maximized within the height of the label.
- A blank margin above the text allows for 0.76-mm (0.030-in) vertical print drift.
- A blank margin below the text allows room for lowercase descenders, such as g and q, while also providing allowance for vertical print drift.
- The left margin allows for horizontal print drift.
- The horizontal scaling of the text field squeezes enough characters onto the label to match the maximum data encoded in the barcode.

Template 5—Four small text fields

Example label



Label Editor parameters and preview



Overview

The 0.0635 by 5.08 cm (0.25 by 2.0 in) label, although small, can fit multiple text fields easily. This template features four text fields that are all legible and can hold a generous amount of data. This text-only label can be paired with a barcode-only label, such as Template 2, on the same microplate.

Specs for text

Fields 1 and 2 (left): 20 characters, maximum

Fields 3 and 4 (right): 13 characters, maximum

Design features

- The Droid Mono Bold font offers consistent character spacing, discernible characters and a modern, attractive look.
- The text height is scaled to fit one field above the other in the vertical space.
- Horizontal scaling offers good data density without sacrificing legibility.
- Above the text, a blank margin allows for some vertical print drift.
- Adequate space separates each field to prevent characters from overlapping, even with a mix of uppercase and lowercase characters.
- Below the text, a blank margin allows room for lowercase descenders, such as g and q, while also providing allowance for vertical print drift.

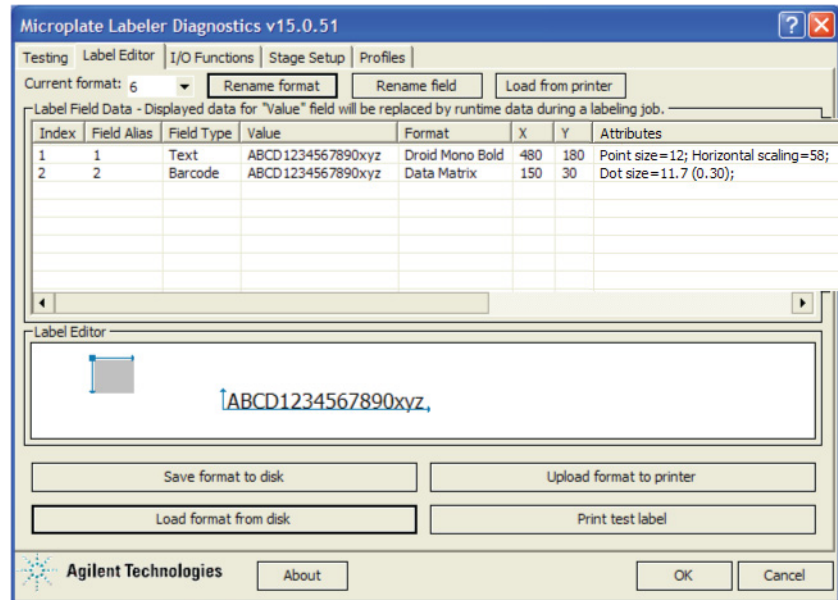
- Generous left and right margins allow for horizontal print drift. The print drift specification is ± 0.76 -mm (± 0.030 -in) for positioning the edge of the label to the edge of the label backing.
- The usable width of fields 1 and 2 (left) is slightly greater than fields 3 and 4 (right), offering options for both longer and shorter data sets.

Template 6—Data Matrix symbology with large text field

Example label



Label Editor parameters and preview



Overview

The Data Matrix symbology (with this dot size) encodes roughly the same amount of data that can fit on a label with the Code 128 symbology. So, Template 6 is analogous to Template 1. Because the Data Matrix symbology is so much denser than the Code 128 symbology, the text field can be much larger than the corresponding one that is paired with Code 128 in Template 1.

Specs

Maximum data: 24 numerals or 16 alpha characters (The maximum alphanumeric length depends on the character mix.)

Design features

- Data Matrix is a very dense and a very popular 2D symbology.
- The dot size used in this template is conservative, promising good readability.
- Generous margins are provided on both the right and left of the barcode.
- The blank margin above the barcode allows for 0.76-mm (0.030-in) vertical print drift.
- The blank margin below the barcode will vary depending on the amount of data encoded. The example shows the maximum data length while still maintaining a 0.76-mm (0.030-in) bottom margin.

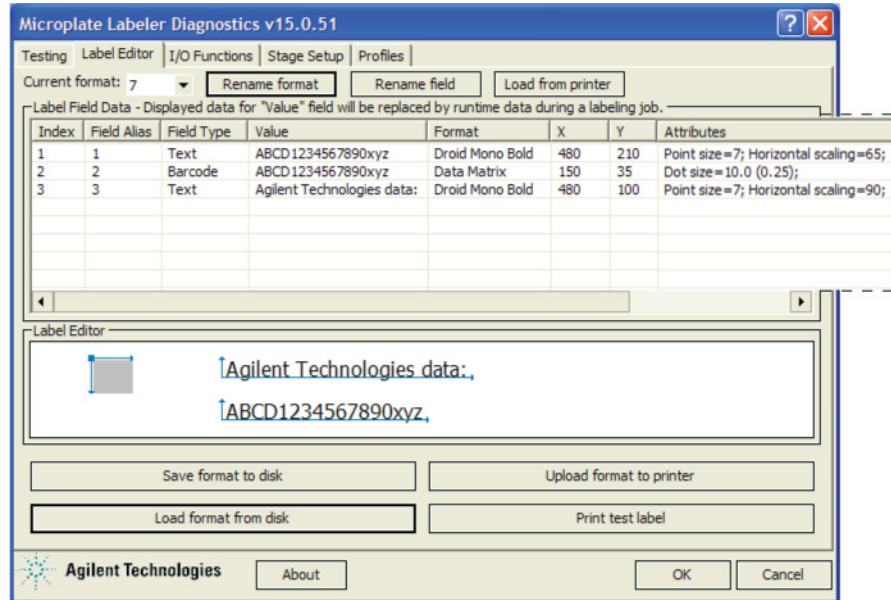
- The barcode is positioned to the left of the text in the event that too much data is used for the text fields. In this case, the text will run off the right edge of the label and will not interfere with the barcode.
- The Droid Mono Bold font offers consistent character spacing, discernible characters, and a modern, attractive look.
- The font size is large to offer optimum legibility.
- The text field is scaled horizontally so it can fit enough characters to match the data that can be encoded in the barcode.
- The text field is left-justified to allow for the longest possible strings for the available space.
- Generous space above and below the text allow for vertical print drift.

Template 7—Data Matrix symbology with two small text fields

Example label



Label Editor parameters and preview



Overview

The use of the Data Matrix symbology with this dot size allows a large amount of data to be encoded into a symbol that only uses a small portion of the label. Template 7 leverages the large remaining space for two text fields. The upper text field can contain any extra information that might be useful on the label. The lower text field is sized to match the same number of characters that can fit in the barcode.

Specs

Maximum data: 36 numerals or 25 alpha characters (The maximum alphanumeric length depends on the character mix.)

Design features

- Data Matrix is a very dense and a very popular 2D symbology.
- The dot size used in this template is relatively conservative for readability, but still allows for twice the amount of data that can fit on a label with the Code 128 symbology.
- Generous margins are provided on both the right and left of the barcode.
- The blank margin above the barcode allows for 0.89-mm (0.035-in) vertical print drift.
- The blank margin below the barcode will vary depending on the amount of data encoded. The example shows the maximum data length while still maintaining a 0.89-mm (0.035-in) bottom margin.

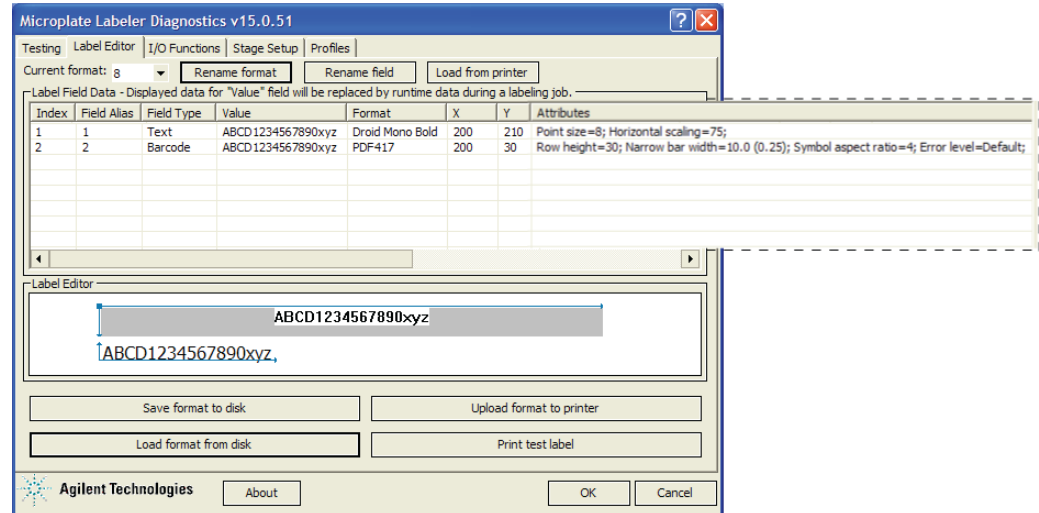
- The barcode is positioned to the left of the text in the event that too much data is used for the text fields. In this case, the text will run off the right edge of the label and will not interfere with the barcode.
- The Droid Mono Bold font offers consistent character spacing, discernible characters, and a modern, attractive look.
- Text field 1 (top) offers good legibility and space for up to 26 characters.
- Text field 2 (bottom) compresses the horizontal scaling to match the data that can be encoded in the symbol.
- The text fields are left-justified to allow for the longest possible strings in the available space.
- Margins above and below the text are adequate to allow for some vertical print drift.

Template 8—PDF 417 symbology over medium-size text field

Example label



Label Editor parameters and preview



Overview

The PDF 417 symbology can be used to create a template that is analogous to Templates 1 and 6. In this case, slightly more data can be encoded than in either the Code 128 or Data Matrix symbologies, while maintaining a medium-size text field.

Specs

Maximum data: 33 numerals or 24 alpha characters (The maximum alphanumeric length depends on the character mix.)

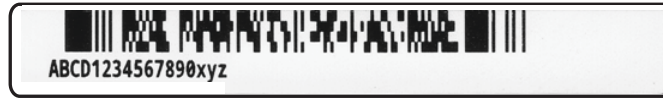
Design features

- PDF 417 can encode large amounts of data.
- The narrow bar width used in this template provides good readability while allowing a large amount of data to be encoded.
- In compliance with recommended practices, the format features a row height at least 3 times the narrow bar width.
- The symbol aspect ratio is set so the symbol will stretch across the label and allow space below the barcode for text.
- The format uses the printer's default error level of 0.
- Generous margins are provided on both the right and left of the barcode.
- A blank margin above the barcode allows for 0.76-mm (0.030-in) vertical print drift.

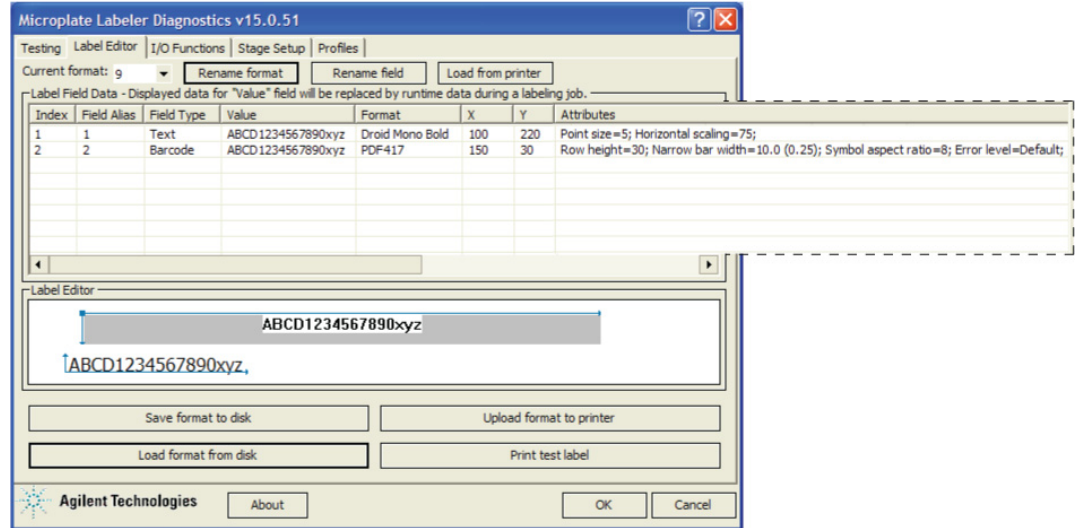
- The space below the symbol will vary depending on the amount of data encoded. The example shows the maximum data length, while still maintaining a 0.25-mm (0.01-in) margin to separate the text and the barcode.
- The Droid Mono Bold font offers consistent character spacing, discernible characters, and a modern, attractive look.
- The font size is larger than what is used with Code 128 in Template 1 but smaller than what is used with Data Matrix in Template 6.
- The text field is scaled horizontally to match the data that can be encoded in the barcode.
- The text has a generous margin on the left. The margin on the right will vary depending on number of characters.
- The text field is left-justified to allow for the longest possible string in the available space.
- A blank margin below the text allows for some vertical print drift.

Template 9—PDF 417 symbology over small text field

Example



Label Editor parameters and preview



Overview

Template 9 features the PDF 417 symbology, which can encode the most data on this size label. To fit the same amount of data in the text field that can be encoded in the barcode, the text field is small and compacted horizontally.

Specs

Maximum data: 58 numerals or 41 alpha characters (The maximum alphanumeric length depends on the character mix.)

Design features

- PDF 417 can encode large amounts of data.
- The narrow bar width used in this template provides good readability while allowing a large amount of data to be encoded.
- In compliance with recommended practices, the format features a row height at least 3 times the narrow bar width.
- The symbol aspect ratio is set so the symbol will stretch across the label and allow space below the barcode for text.
- The format uses the printer's default error level of 0.
- Generous margins are provided on both the right and left of the barcode.
- A blank margin above the barcode allows for 0.76-mm (0.030-in) vertical print drift.
- The space below the symbol will vary depending on the amount of data encoded. The example shows the maximum data length, while still maintaining a 0.51-mm (0.02-in) margin to separate the text and the barcode.

- The Droid Mono Bold font offers consistent character spacing, discernible characters, and a modern, attractive look.
- The font size is small to fit the available space, but is still legible.
- The text field is scaled horizontally to match the data that can be encoded in the barcode.
- The text has a generous margin on the left. The margin on the right will vary depending on number of characters.
- The text field is left-justified to allow for the longest possible string in the available space.
- A blank margin below the text allows for some vertical print drift.



Request for Microplate Labeler Applications Support

Can we help?

Please complete this form (Acrobat Reader 7 or above required), then click the Submit button to email it to Automation Solutions Technical Support (service.automation@agilent.com). ***Required fields**

About me

*Name: _____

*Address: _____

*Email: _____

*Tel/Fax: _____

My Agilent representative: _____

Please call me to discuss my application: ☐ Yes ☐ No

*I need a solution to this challenge by: _____

Inquiry topic

☐ Adhesive label. Part number: _____ Lot: _____

☐ Ribbon. Part number: _____ Lot: _____

☐ Fitting content within standard size label

☐ Need larger label ☐ Need smaller label

☐ Barcode reader/reading challenge. Manufacturer: _____
Part number: _____

☐ 2D imager/reading challenge. Manufacturer: _____
Part Number: _____

☐ Software assistance. Software: _____ Version: _____

☐ Other: _____

About the Microplate Labeler

☐ Microplate Labeler was purchased after September 1, 2009

☐ Microplate Labeler was purchased before September 1, 2009

Microplate Labeler serial number: _____

☐ We are using a demo Microplate Labeler.

☐ We want to know if our microplate is compatible with the
Microplate Labeler.

☐ This Microplate Labeler is part of a 3rd-party (non-Agilent) lab
automation system.

Label design and content

Symbology

☐ Code 128 ☐ Code 39 (full ASCII) ☐ Interleaved 2 of 5

☐ Codabar ☐ Code 93 ☐ HIBC ☐ Data Matrix (2D)

☐ PDF 417 (2D) ☐ Micro PDF 417 (2D)

Typeface (font)

☐ 12 x 12 ☐ 16 x 16 ☐ 16 x 32 ☐ OCR-A ☐ OCR-B

☐ Swiss 721 ☐ Swiss 721 Bold ☐ Monospace 821

☐ Droid Mono ☐ Droid Mono Bold

Number of fields on the label

☐ 1 ☐ barcode ☐ numeric ☐ text ☐ alphanumeric

☐ 2 ☐ barcode ☐ numeric ☐ text ☐ alphanumeric

☐ 3 ☐ barcode ☐ numeric ☐ text ☐ alphanumeric

☐ 4 ☐ barcode ☐ numeric ☐ text ☐ alphanumeric

☐ 5 ☐ barcode ☐ numeric ☐ text ☐ alphanumeric

☐ 6 ☐ barcode ☐ numeric ☐ text ☐ alphanumeric

☐ Label design example (email file to service.automation@agilent.com)

Data source

☐ comma delimited ☐ tab delimited ☐ spreadsheet: _____

About the microplate and support

*Manufacturer and part no.: _____

*Material: _____

Microplate contents (chemical description), if related:

☐ Microplate drawing supplied
(email to service.automation@agilent.com)

☐ Microplate support, if used: _____



Microplate Labeler Reference Guide
G5404-90004