Microsoft®

tag

Rendering Microsoft® Tags in the .tag File Format

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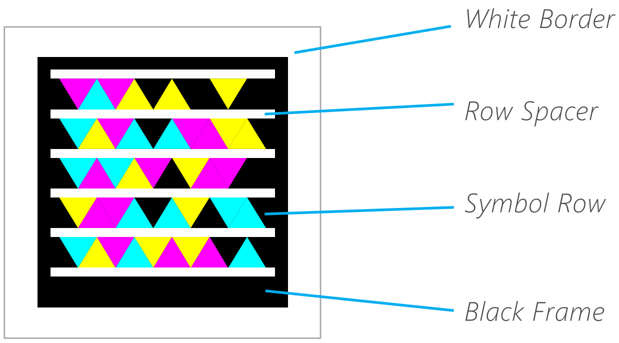
Overview

Rendering a Microsoft Tag in the .tag file format provides a hexadecimal code for the Tag that you can use to programmatically generate your Tag in other applications. This document explains how to interpret the hexadecimal encoding of a Tag and how to generate a scannable graphic.

General Layout

Microsoft Tags are available in a four-color version (using pure versions of cyan, magenta, yellow, and black) and in a larger black-and-white version. Each Tag includes:

- *A white border*
- *A black frame*
- *Symbol rows*
- *Row spacers*



The symbols within a standard Tag are triangles. However, for custom Tags, the symbols can be dots. The symbol rows are separated from the frame and from one another by row spacers. The black frame is enclosed in a white border; the width of the white border is equal to the height of the lowest black bar.

The number of symbol rows depends on the Tag type. Standard color Tags have five symbol rows, whereas standard black-and-white Tags have seven. Regardless of type, Tags always have twice as many symbols per row as they have rows. For example, standard, five-row color Tags will always have 10 symbols per row. Standard black-and-white Tags will always have 14 symbols per row.

ENCODING

Microsoft Tags are represented in hexadecimal format that can be stored in the .tag file format. They can also be retrieved from the Microsoft Tag API. Each .tag file can contain one or more hexadecimal encodings of a given Tag, to allow the Tag graphic to be created in different formats. Different formats will be separated by a semicolon and a space.

Note: The encoding for a color Tag inside a .tag file cannot be converted to a black-and-white Tag.

To interpret the hexadecimal code for a Tag, use the following guidelines:

1. The first character in the series indicates the Tag type. Currently, the only possible values are 0 (black-and-white) or 1 (color). The interpretation of the rest of the characters in the encoding is determined by the Tag type.

2. For both color and black-and-white Tag types, the second character in the series indicates the number of rows that make up the Tag. While standard black-and-white Tags are made up of 7 rows each and standard color Tags are made up of 5 rows each, Tags created in the future can consist of as few as 4 rows and as many as 15 rows.

3. For both of these Tag types, the third and subsequent characters specify the color of each symbol within the Tag. The Tag symbols are encoded left to right, starting with the top row. For color Tags, each character contains two symbols. For black-and-white Tags, each character represents four symbols. If the number of symbols in a Tag does not divide evenly by two (for a color Tag) or four (for a black-and-white Tag), the last character will be padded with zero-valued symbols as necessary.

Each symbol within a black-and-white Tag corresponds to a 1-bit value. Each symbol within a color Tag corresponds to a 2-bit value.

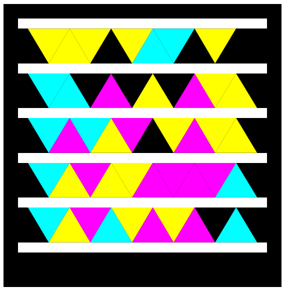
The color values used for the symbols in a Tag are shown in the following table.

COLOR TAGS (2-BIT VALUES)	
00	Yellow
01	Magenta
10	Black
11	Cyan

BLACK-AND-WHITE TAGS (1-BIT VALUES)	
0	Black
1	White

For example, let's look at the hexadecimal values for both a color Tag and a black-and-white Tag that, when scanned, will open the Microsoft Tag website.

The color Tag for the URL looks like this:



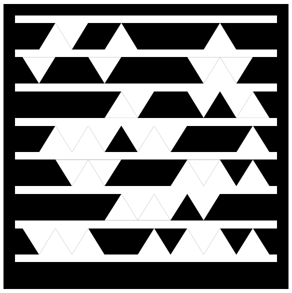
The hexadecimal code for this Tag, when rendered in the .tag format is:
15CCFC25B0BCDC61F83E5FC711B

The initial character, "1," indicates that this is a color tag. The second character, "5," indicates the number of rows in the Tag—this Tag has five rows. The third value, "C," indicates the first two symbols in the row. Each subsequent hexadecimal character represents two symbols in a symbol row.

Translated from the hexadecimal, "C" becomes "1100," which designates a cyan symbol followed by a yellow symbol, as you can see in the Tag itself. The rest of the hexadecimal characters are interpreted in the same way.

In contrast, let's look at the image and coding for the black-and-white Tag that opens the same website.

The black-and-white Tag for this URL looks like this:

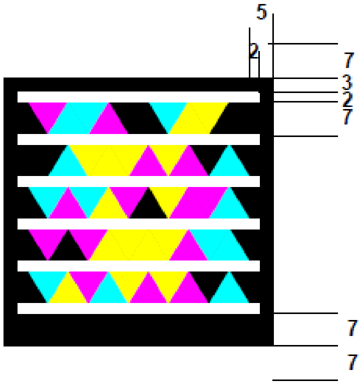


The hexadecimal code for this Tag is: 07A169EEF34AF2E138806187174

In the above example, each hexadecimal character represents four symbols in a symbol row. The initial character, "0," indicates that this is a black-and-white Tag. The second character, "7," indicates the number of rows in the Tag—this Tag has seven rows. When converted from hexadecimal, the third character, "A" gives us "1010." Because this is a black-and-white Tag, "1010" here designates four symbols: white black white black.

Calculating Sizes

To lay out a Tag, you must calculate the basic unit size of the Tag. Use the following rules to calculate the size of the Tag:



- Each row of symbols within a Tag must be 7 units tall.

- A row spacer, 2 units high, must be included:
    - o Above the first row
    - o Between each row
    - o Below the last row

  The row spacers extend 2 units into the left and right edges of the black frame.

- The black frame that surrounds the Tag symbols must have the following dimensions:
    - o 3 units tall on top
    - o 5 units wide on the left and right sides
    - o 7 units tall on the bottom.

- The white border that surrounds all four sides of the Tag must be 7 units thick.

Note: The "units" indicated in these guidelines apply to any unit of measure upon which the Tag is based.

The following table shows how to calculate the dimensions of sample color and black-and-white Tags.

TAG DIMENSION	COLOR TAGS	B/W TAGS
Number of Rows	**5**	**7**
Bar Code Height (in Units): • _7 For the top white border_ • _3 For the top frame_ • _7 For the bottom black frame_ • _7 For the bottom white border_ • _7 For each row_ • _2 Between rows and between rows and frames 7+3+7+7+7*rows+2*(rows+1)=26+9*rows_	26+9*5=71	26+9*7=89
Symbols per Row _Note: This number is always equal to 2*Rows._	**10**	**14**
Row Width (in Units): • _7 For the left white border_ • _5 for the left black frame_ • _5 for the right black frame_ • _7 For the right white border_	71-24=47	89-24=65
Symbol Widths per Row _The symbols are laid out in a triangle pattern. So, the actual triangle widths that fit into a particular row is equal to one-half the number of symbols plus half of the symbol._ _Base Width = Symbols Per Row/2+ one half_	$10/2 + {}^{1}/_{2} = 5\ {}^{1}/_{2}$	$14/2 + {}^{1}/_{2} = 7\ {}^{1}/_{2}$
Symbol With (in Units) The width of the triangle symbol is calculated by dividing the row width by the width of the symbols.	47/5.5 = 8.545	65/7.5=8.533

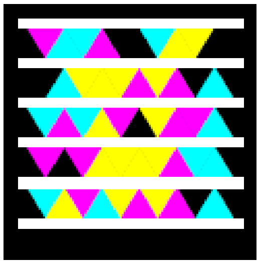
Drawing the Symbols

All shapes are drawn based on the actual size of the bar code and the calculated unit size. For example, if you are publishing a Tag in a magazine, you may choose to create a Tag that is one inch square. A 5-line 1-inch bar code has 71 units, so each unit is 0.014085 inch. The bottom black frame is 7 units tall, so it winds up being 7/71*1 inch tall, or 0.098592 inch. If, instead of publishing a one-inch Tag in a magazine, you plan to create a Tag that will be included in a billboard, you will have to re-calculate much larger units to ensure that your Tag can be scanned from a distance.

The following table shows the relative size of each type of Tag.

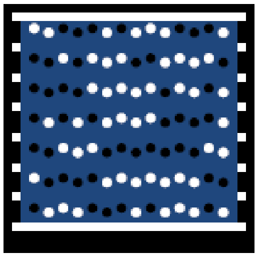
SIZE (IN RELATION TO OVERALL SIZE	5-ROW COLOR TAG	7 ROW B/W TAG
White border	7/71	7/89
Black Frame (Top)	3/71	3/89
Black Frame (Sides)	5/71	5/71
Black Frame (Bottom)	7/71	7/89
Frame Height and Width	57/71	75/89
Row Spacers Height	2/71	2/89
Row Spacer Width	51/71	69/89
Row Overlay over Frame Sides	2/71	2/89
Row Width	4/71	65/89
Triangle Height	7/71	7/89
Triangle Width at Base	47/(71*5.5)	65/(89*7.5)

EXAMPLE: STANDARD TAG



Between the black frame and the first triangle in a row of symbols is a half-triangle that is black. The first full triangle in the row is drawn next to the black half-triangle, base-side up. The last triangle of a row is drawn base-side down, followed by a black half-triangle between it and the black frame on the right of the Tag.

EXAMPLE: CUSTOM TAG



When drawing a basic custom Tag, the symbols are shown as dots instead of triangles and a bar code background—in this case, the blue field—shows through the space between the frames. The first and last row spacers are white, as are the remaining row spacers that overlap the frame sides. The background should show through the row-spacers that are between the rows and between the frames. In addition, the background shows through the parts of each triangular symbol that is not taken up by the dots, and the additional half-triangle spaces at the beginning and the end of each row. In other words, the background shows through every position inside the frame except where the dots and the top and bottom row spacers appear.

Dots are drawn with a diameter that is one-third of the width of the triangles. The dots must be horizontally aligned at the center of each triangle, and vertically aligned one-third of the way toward the center of the triangle as measured from the triangle's base.