



Card Design Guide

Entrust Sigma DS4 Direct-to-Card Printer



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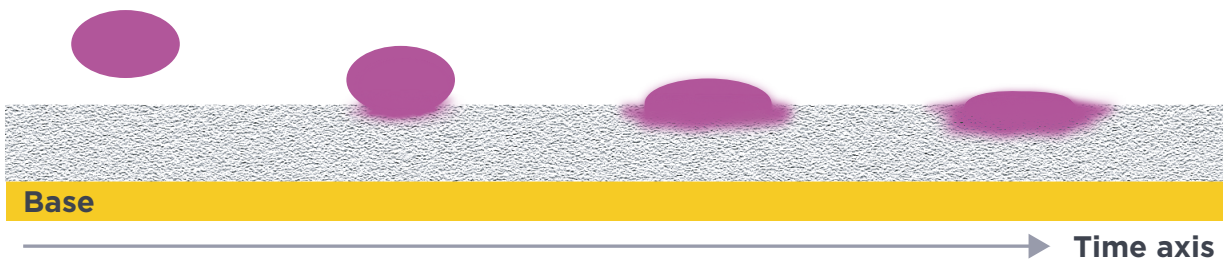
SECURING A WORLD IN MOTION

Optimizing card designs for dye sublimation direct-to-card printing

The Entrust Sigma DS4 direct-to-card Printer is designed for printing cards with the quality that emulates your on-screen colors for vibrant color and sharpness. With edge-to-edge printing capabilities and a print resolution of up to 300 x 1200, Sigma DS4 allows you to print fine details of images and small text. The printer automatically adjusts its settings to match ribbon type for maximum image quality. Also, it has a capacity to provide automated color and image density adjustment, ribbon usage tracking, ribbon conservation.

Direct-to-card print technology

Dye colors are made when absorbed into the card substrate via heat and pressure. The thermal printhead applies the heat by adjusting the temperature to deliver the appropriate color intensity. More heat means more density; less heat means less density. The different dye inks mix together to offer a wide range of colors, but at a lower cost than pigment ink retransfer printers.



- Color (Y, M, C): Only panels that are used for dye printing.
- Monochrome (K, Graphics): Whether it is part of a panelized ribbon (blank) or a graphics ribbon (single colors), monochrome printing is pigment-based printing.
- Protection (T): Panelized ribbons can have a topcoat protective coating that increases the durability of the printing. This must be applied over color printing and it is recommended over monochrome.
- Other: There are other panels that offer unique features like fluorescent or luster panels.
- Durable Graphics: This combines monochrome and protective print technologies to create the most durable direct-to-card printing.



Solid background colors

Just as with any type of printing, solid colors may not print uniformly on dye sublimation ink printing. Small changes in the color may be visible and are the result of minute variation in printing mechanics. These color changes may be more visible in neutral colors. To mitigate small changes in solid colors, add texture, fill the area with an image, or add a drop shadow to make them more distinct and bring the card design to life.



Figure 1: Solid colors may exhibit streaking or variation. Red and blue solid areas may print with different densities from top to bottom.



Figure 2: Texture was added to the red area, the blue area was filled with an image, and a drop shadow was added to the text to make it more distinct.

Card surface quality

Because a direct-to-card printer is printing at the card substrate, print quality is affected by the card surface. Best results occur on a smooth glossy surface. Some common issues that can compromise the card surface, and thus the print quality, include:

- Any chemical contamination (oils, grease, cosmetics or other) on the substrate can change the rate of dye transfer to the card surface, which can result in a darker or lighter appearance; oils can also inhibit the transfer of monochrome text printing. The physical irregularities on the card surface prevent an intimate contact between the card surface and ribbon/printhead causing print dropouts.
- Best printing occurs on smooth, glossy surfaces. Any satin/matte surfaces should be tested beforehand for performance. Surface roughness or topography can result from the following:
 - Satin/Matte Finish: Intentionally roughing up the surface
 - Smart Cards: Whether contact or contactless, chips can add topography to the surface of the card
 - Debris: Can originate from the manufacturing process of the cards and could create a void or crater in the outer layer

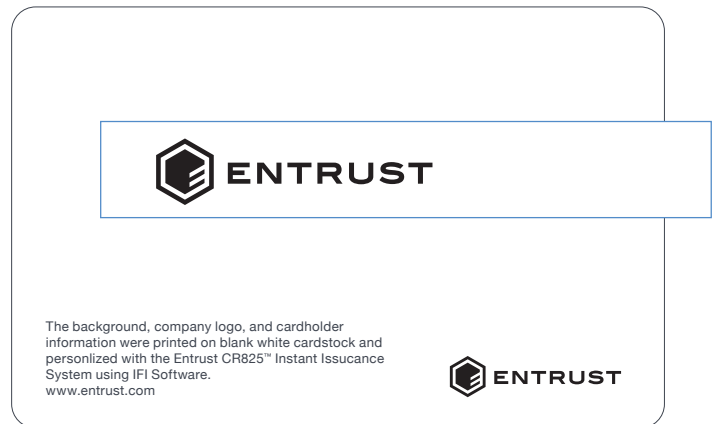
- Card surface material and surface roughness can influence the print quality and durability of any thermal graphics printing.
 - Polished PVC cards or cards with polished PVC overlamine are found to be suitable for use
 - Other card types, such as PETG and varnished cards, or non-polished PVC cards should be tested by the users for quality and durability before making their final selection

Crisp lines and text

The Sigma DS4 card printer prints at 300 dpi, meaning it can produce crisp and clear 4-point text in a solid monochrome color, such as black. Using anti-aliasing when combining image layers in Photoshop, or compressing images like jpegs when saving the image, can create visual artifacts in the image that the printer attempts to reproduce. Ensure your images are crisp to get the highest resolution.



Anti-Aliasing



Aliasing

Upscaling (or downscaling) images

An image that is not 300 dpi needs to be resampled to 300 dpi at some point. Often, the software program does this without your knowledge. But how and when this is done may impact the quality of the image. If you need crisp lines, like in a logo, avoid a resample process by using the native resolution including the correct page size. Upscaling busy color images, such as photographs or portraits, may not be noticeable if you have a good upscale process. If upscaling must be done, starting from a known integer multiple of 300 dpi image provides the best result.

Using Entrust software

Entrust recommends using Instant Financial Issuance Software to take full advantage of the Sigma DS4 card printer capabilities.

Page sizing

Printing Technology	Canvas Size (Pixels)	Canvas Size (in/mm)	Card Surface
Sigma DS4 printer	638 X 1013 (at 300 X 300 dpi) (Optional 300 X 600 dpi and 300 X 1200 dpi)	2.13 X 3.38 inches 54.0 X 85.8 mm	ISO ID-1

Images intended for monochrome printing (like black) when combined with color printing must be a 1-bit grayscale. If the printing ribbon only supports monochrome for that printed side, the driver will grayscale the image to an 8-bit image.

Using color modes

Best practice is to maintain an ICC color workflow by adjusting your image to produce the desired color. If that's not possible, the direct-to-card printer allows you to select from several color modes, which are made for backward compatibility.

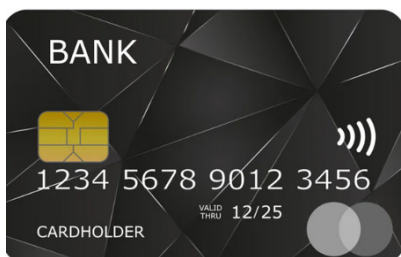
Light Curing Module CVV printing guide

As branch banks continue their journey to flat card printing, some issuers want the flexibility to use up their existing 2-color design cardstocks rather than immediately update their card designs to be more suitable for single-color printing.

Common challenge for Sigma DS4 printers with LCM:

2-color perso card designs with frontside white perso and backside black perso and backside white box adjacent to signature panel. So, where to put CVV/CVC using single color white perso?

White Perso Print

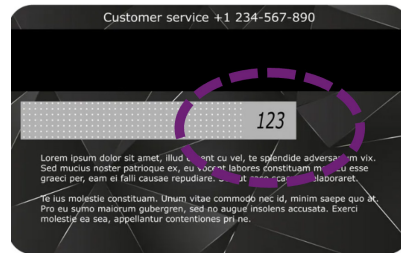
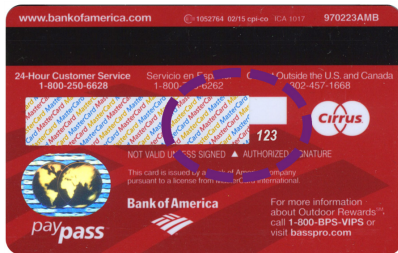


Black Perso Print



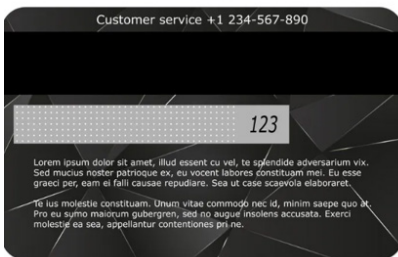
Solutions for using UV curable ribbons with Light Curing Module:

- Printing CVC/ CVV next to signature panel and/or below the white box
- Mastercard allows for printing of the CVC outside the white box
- Visa has granted limited approval – requires specific card design approval of further CVV printing outside the box examples prior to giving broad acceptance



Solutions for ES1 module indenting with black ribbon:

- You can continue to use ES1 module to indent CVC/ CVV in the back



CVC/ CVV placement recommendations:

- Ensure placement does not overlap chip dimple
- Align print with bottom of signature panel for best aesthetic

Ideal image layout and formats

Image Size	<ul style="list-style-type: none"> • 2.13 x 3.38 inches, 54.0 x 85.8 mm, 638 x 1013 pixels (at 300 x 300 dpi) • Light Curing Module needs a 300 x 600 or 300 x 1200 image
Font Size	<ul style="list-style-type: none"> • Decorative and serif fonts may require a larger point size than sans serif fonts for readability • Test 4-point type (sans serif) and larger for readability • Test 6-point type (decorative and serif) and larger for readability
Supported Color Spaces	<ul style="list-style-type: none"> • All image rendering/compositing work is performed in a user-defined RGB working color space • sRGB IEC61966-2.1 (default) • 24-bit maximum color supported
When Saving Images	<ul style="list-style-type: none"> • Always work from a master version, keeping a large color gamut in known color space (such as sRGB IEC61966-2.1) and all layers and effects intact • Use “Save As” to create a new file (a copy) in a preferred format for production • Flatten production files to remove layers and finalize transparency (see earlier aliasing example) • Save images as PNG, TIFF, or BMP <p><i>Entrust recommends a format with no compression or lossless compression (see earlier “Crisp lines and text” section). If this is not possible, then use the lowest level of compression available.</i></p>

Preferred File Formats in Order	File Format	RGB Support	Compression (Supported Types)	Expected Quality
	PNG	Yes, grayscale and monochrome	Lossless	Mid- to high-quality
	TIFF	Yes	Uncompressed Lossless	Low- to high-quality
	BMP	Yes, grayscale and monochrome	Uncompressed	Mid- to high-quality
	JPEG	Yes	Lossy	Low- to mid-quality

Direct-to-card images FAQs

Q: Why is there a white line around my magnetic stripe?

A: Color backs require additional blocking features to accommodate the preprinted element shifting on the cardstock and use double the ribbon.

Q: Is there a formula to help in color adjusting images?

A: Using ICC Workflow, begin with targeted RGB values, though additional adjustments may be necessary.

Q: Why can't I achieve the color I want?

A: As with all desktop printers, your desired color may be outside of the printer's gamut. A different color mode may result in closer colors.

For more information

888.690.2424

+1 952 933 1223

sales@entrust.com

entrust.com

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Learn more at
entrust.com



Global Headquarters
1187 Park Place, Minneapolis, MN 55379
U.S. Toll-Free Phone: 888 690 2424
International Phone: +1 952 933 1223

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