

Silicon Chip Destination Display Configuration sketch for Processing

We used the Processing language to create the configuration programming sketch, so you will need the Processing IDE (preferably version 4.4.7 or later), which can be downloaded from <https://processing.org/>

The sketch presents as a windowed application with buttons, text fields and the like. Processing does not provide these graphical user interface (GUI) features, so we have had to create them from scratch.

There is no image editing and only very basic text editing capabilities, so we recommend using other programs to do this. Like us, you might find edge cases in the sketch that will cause it to crash, but it should be well-behaved with sensible inputs.

Open the sketch file (Destination_Config.PDE) and click the Play button at the top of the window to run the program; this will open in a new window. The File Menu also has an option to export a standalone application; naturally this will only work on the same operating system that it is created on.

The screenshot shows this window in use. There are three main steps; first, the image data at left is created or loaded. Secondly, the individual index items are created, based on the image. Finally, the data is generated and exported to a file.

Image data

You can load image data via a file (eg PNG, GIF or JPEG). The image is converted to monochrome using a threshold ("thresh." text box) between 0 and 1. A lower value will result in more white pixels and a higher value more black pixels. The image width is cropped at 128 pixels and the "w" and "h" fields are set based on the image.

If you need to adjust the threshold, click on the number box and enter a new value, then reload the image using the "Load image" button. If the image is taller than the window, you can scroll up and down using the up and down arrows at top left.

Alternatively, you can enter text in box under "Load text". This is a simple multi-line field, so you can't move around within the field using the arrow keys; the text can only be edited at the end. You can use Backspace to remove the last character and paste from the clipboard with Ctrl-V. Delete all text with the Delete key. Use the "Load text" button to generate an image from the text in this field.

This step responds to the threshold field as well as the "w", "y pitch" and "cond." fields. The "w" field sets the width (in pixels) of the generated graphics, while the height depends on the number of lines of text and the "y pitch" value.

The "cond." (condensed) field can be used to narrow the text if it is too wide. For example, the data generated in the screenshot uses the value of 0.7. You can use a value larger than 1 to expand the text if desired. The "Save img" button can be used to export this image to a PNG file; there is no prompt for a filename and it is saved in the sketch folder with a name based on the current timestamp.

Index items

The "Create fixed" buttons will do most of the work of generating the single-screen index items. Press "CLEAR ALL" if necessary to clear any existing entries. If you want the indices to start at a specific value, you can enter this in the "index" field. You should also set the "type" field to suit the scroll rate (or FIXED for non-scrolling items), or click the button below it to view the options.

Any animated or multi-screen items need to refer back to a single-screen item, so these items will need to be generated anyway. You should see the sample views at right populate when the "Create fixed" button is pressed and you can scroll up and down through these with the "UP" and "DOWN" buttons.

Dual screen items can then be generated by setting the index, type and index 1 and index 2 values before pressing "Create #". The index 1 and index 2 values can be entered manually or loaded by pressing the "<1" or "<2" buttons next to the desired images.

For example, to generate an animation showing "ADELAIDE AIRPORT" over two screens, click the "1X MED" button until it shows one of the 2X types, then click "<1" next to "ADELAIDE" and "<2" next to "AIRPORT" at right. Finally click "Create #31" to generate the item, which can be previewed by scrolling down the list at right.

Triple screen items are created in a similar fashion, by choosing one of the 3X types and ensuring that all three pointers are loaded correctly. Note that triple items can only use an index up to 31, since there are only 16 bits available for indexing. The index will increment after each item is created, so it is not hard to create a number of similar items.

Export

Check that values such as the x, y, w, h, rotation (from Fig.1) and "bright." (brightness from 0 to 255) values are correct. The scale values are ignored by the current version of the software, while the x bytes and pointer values are updated automatically. It's easy to change any header data later using the ST25 NFC Tap app.

Press "UPDATE DATA" to generate the data set. The file size will be reported at the bottom of the column, so you can check that it will fit in the EEPROM of IC2. If all is well, press "SAVE DATA", which will create a .BIN file named for the current timestamp in the sketch directory.

You can now transfer the file to your NFC device (such as an Android mobile phone with the ST25 NFC Tap app) to program the EEPROM chip on the Destination Display using the instructions in the main article.

EEPROM capacity

If you do wish to view or modify the exported file on your computer, then we suggest using the HxD hex editor. This can be downloaded from <https://mh-nexus.de/en/hxd/>

Since the data is a monochrome, uncompressed bitmap, a byte of data can hold eight pixels. Our sample file is 3776 bytes, of which the headers are 192 bytes and the image data is 3584 bytes, corresponding to a bitmap of 56 pixels by 512 pixels; there are effectively 32 unique screens that measure 56×16 pixels.

The 0.50in panel has the most pixels, with 4224 pixels requiring 528 bytes. The 8kiB ST25DV64KC can store 15 full-sized images to suit the 0.50in panel, with room to spare for 64 index items and the header.

The screenshot shows the 'Silicon Chip Destination Display Configuration' window. It features a list of Australian cities on the left, a central configuration area with various input fields, and a right-hand panel for index management.

City List (Left): A scrollable list of cities including ADELAIDE, AIRPORT, ALBION, ARMADALE, ASHFIELD, AUBURN, BAYSWATER, BELL, BRISBANE, BURWOOD, CANBERRA, CENTRAL CITY, CROYDON, DARWIN, EMERALD, EPPING, FAIRFIELD, HOBART, MELBOURNE, MITCHAM, PERTH, RICHMOND, SALISBURY, SUNSHINE, SYDENHAM, SYDNEY, TOWN HALL, and WINDSOR.

Configuration Area (Center): Contains several sections:

- Save img:** A button to save the current configuration.
- Load image:** Fields for x, y, w, h, x scale, y scale, rotation, x bytes, y pitch, bright., pointer, thresh., and cond.
- Load text:** A list of cities for text loading.
- Create fixed:** Fields for index, type, 1x MED, pointer, index 1, index 2, and index 3.
- Buttons:** UP, DOWN, TOP, Create #31, Set # to index, CLEAR ALL, UPDATE DATA, and SAVE DATA.
- Summary:** A box showing '3612 bytes'.

Index Management (Right): A table with 12 rows, each representing an index (e.g., #0:0, #1:1, #2:2, etc.). Each row has a city name (e.g., ADELAIDE, AIRPORT, ALBION, etc.) and three navigation buttons (<1, <2, <3).

The Silicon Chip Destination Display Configuration sketch provides an easy way to generate the data file necessary to create custom displays and can mix and match different styles of animation.