

# Graphics Authoring Tool for S6E2Dx Series Guide

002-04385 Rev. *A

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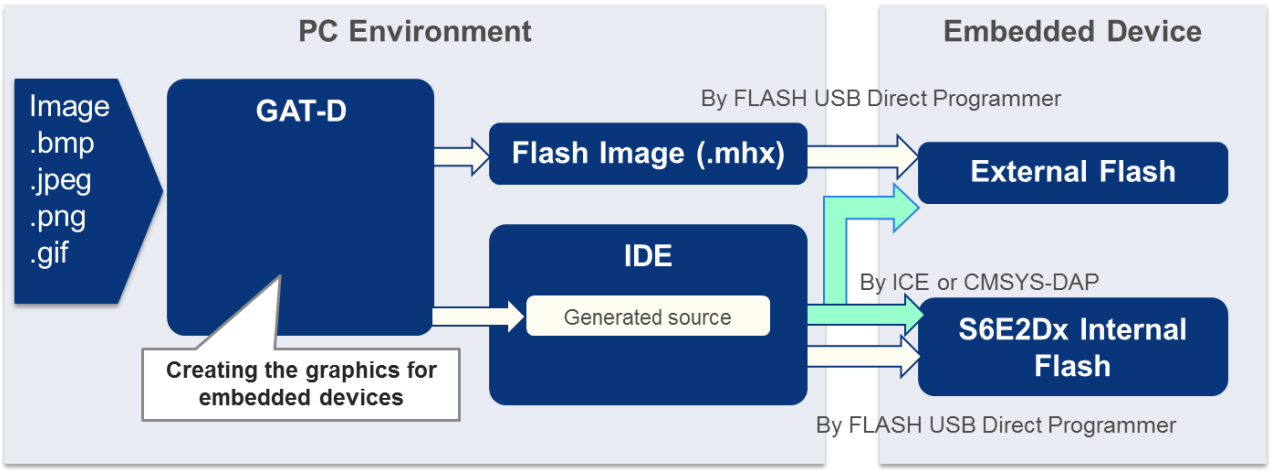
# 1. Introduction

This document describes the Graphics Authoring Tool for the S6E2Dx Series (GAT-D). With this software, users without programming experience can design a human machine interface (HMI) and generate the source code for graphics firmware. Figure 1-1 shows a system summary for the tool.

Figure 1-1. System Summary




## 1.1 System Requirements

Hardware

- ☐ CPU: 1 GHz or more
- ☐ Memory: 512 MB or more
- ☐ Hard disk: More than 1 GB of free space

Operating system

- ☐ Windows 7 (32-bit or 64-bit)
- ☐ Administrative privileges for software installation.

## 1.2 Glossary of Terms

Table 1-1. Glossary of Terms

| Term | Meaning |
|---|---|
| Alpha blending | The semitransparent effect which is to blend overlaid two image data according to a specific alpha value of each pixel. |
| CLUT | The color lookup table that stores the colors and index for its color.<br>The index value in the CLUT is used for the pixel display of the object.<br>The maximum number of CLUTs differs depending on the graphics display controller (GDC). |
| Drawing frame | The drawing area. |
| Folder | Place where files are stored, which include the page and the flow design table in the project. |
| Layer | The basic element forming a page. A layer can contain a number of windows. |
| Object | The two type objects that are vector graphics and sprite. |
| Page | The basic element forming the GAT-D project. The page has two layers, and can draw the overlapped them. |
| Palette | Stores the color value for pixels forming the object (such as a bitmap). |
| Project | Stores all the resources and management information. |
| RGB | The three primary colors: red, green, and blue. In RGB format, colors are combinations of red, green, and blue. |
| Sprite object | A bitmap image object. |
| Vector graphics object | A vector object such as line, rectangle, and circle. |
| Window | The display area on a layer. An object is displayed only if it is inside a window, so all objects must be added to a window. |
| Z-order | The order of the layers on the same page. |

## 1.3 Restrictions

In GAT-D V01 SP1, only the functions related to the sprite and vector graphics (line, rectangle, and circle) are supported.

# 2. Installing and Uninstalling GAT-D

## 2.1 Installing the Tool

The GAT-D software is easy to install.

1. Run the installation program. The setup wizard appears, as shown in Figure 2-1.
2. Click **Next**; the License Agreement dialog appears, as shown in Figure 2-2.

Figure 2-1. Setup Wizard Dialog

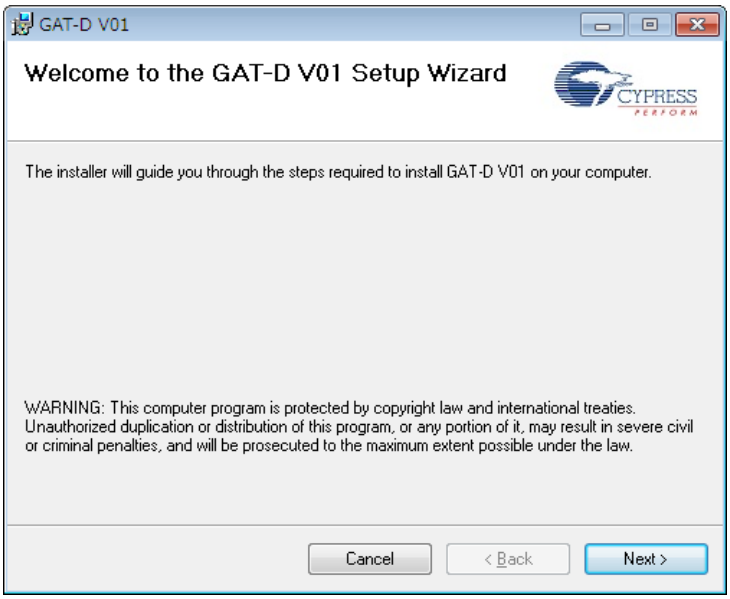
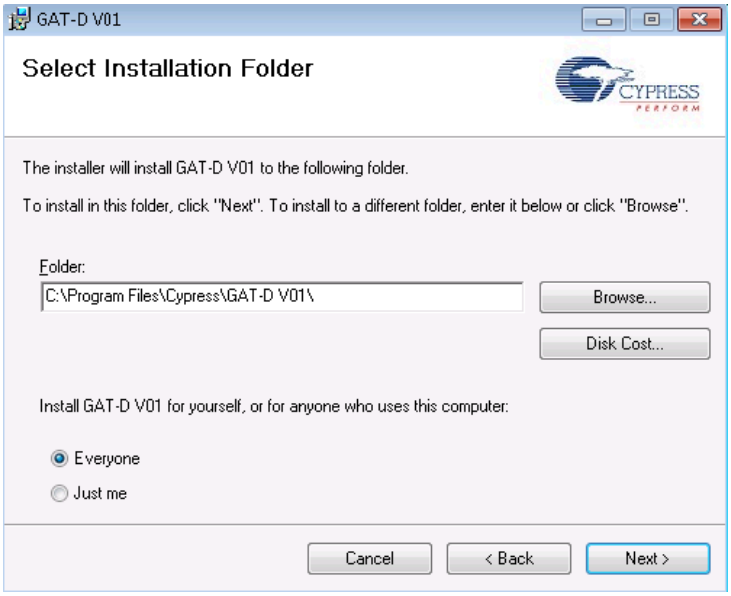


Figure 2-2. License Agreement Dialog



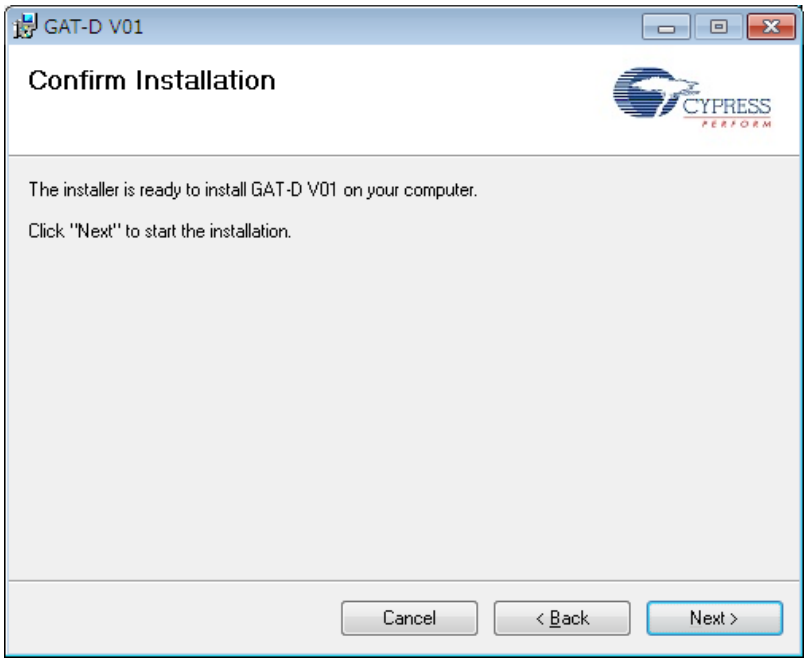

3. If you accept the terms of the license agreement, select **I Agree**, and then click **Next** to go to the next installation dialog as shown in Figure 2-3.

Figure 2-3. Customer Information Dialog



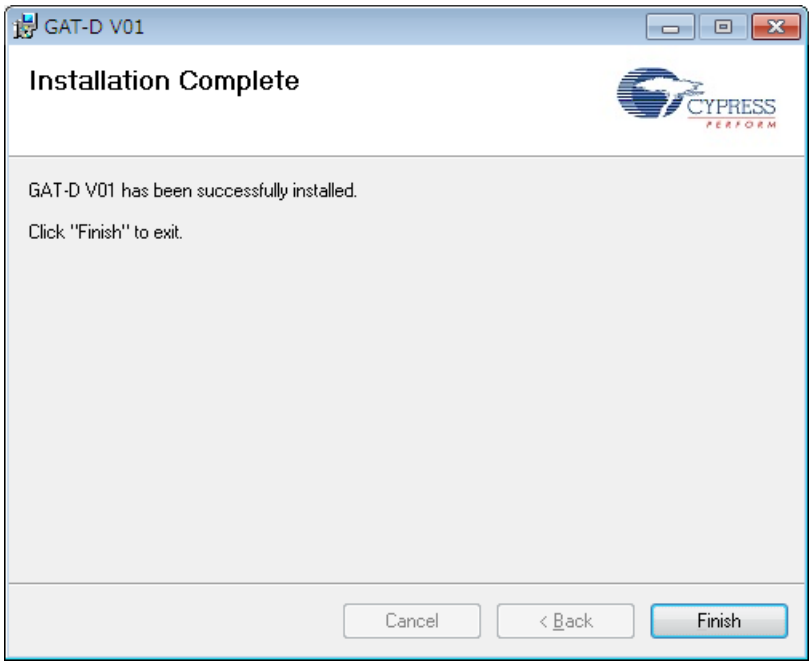
4. The installation folder represents the installation path of the software. The install path is set the default path. Click **Browse** to select the installation path and then click **Next** to go to the last dialog as shown in Figure 2-4.

Figure 2-4. Confirm Installation




5. Click **Back** to return to the previous dialog, or click **Next** to continue. After you click **Next**, the **Installation Complete** dialogs appears, as shown in Figure 2-5.

Figure 2-5. Installation Complete Dialog



6. Click **Finish**. The overall installation is finished, and the software is installed on your computer. You can run it with **Start** > **Programs** > **Cypress** > **GAT-D V01** > **GAT-D V01**.

   **Notes:**

   1. This software must be installed by someone with system administrator privileges.
   2. Uninstall any previous version of the software before you start the installation. If the system has an existing installation of an earlier version, the new installation will fail.

## 2.2 Uninstalling the Tool

This software includes an uninstall shortcut in the **Start** menu.

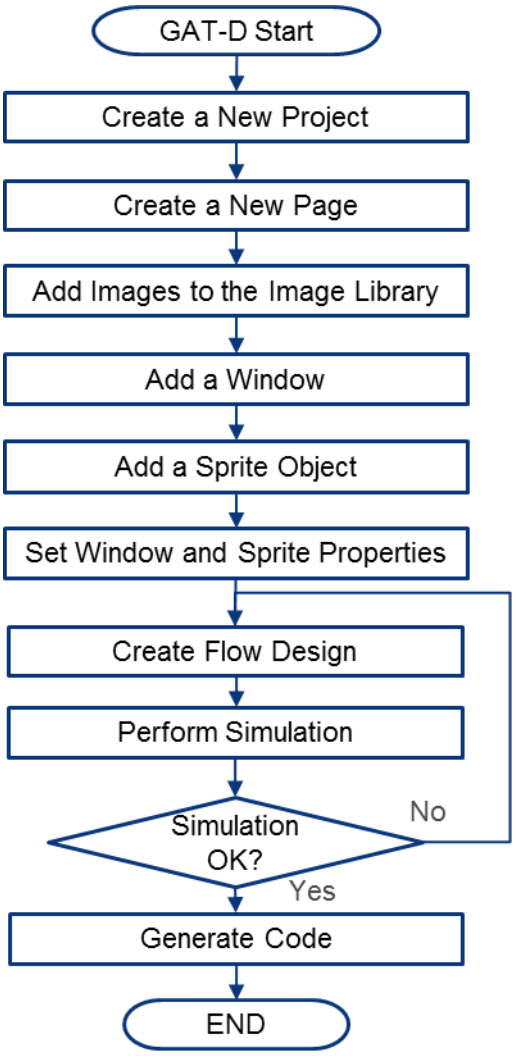
Run **Start** > **Programs** > **Cypress > GAT-D V01** > **Uninstall** to uninstall the software from your computer.

You may also uninstall it using the Add/Delete Programs option in the Control Panel.

# 3. Quick Start

This chapter explains a series of operations from making the project to generating the code of the application for the S6E2Dx Series. A typical workflow is shown in Figure 3-1.

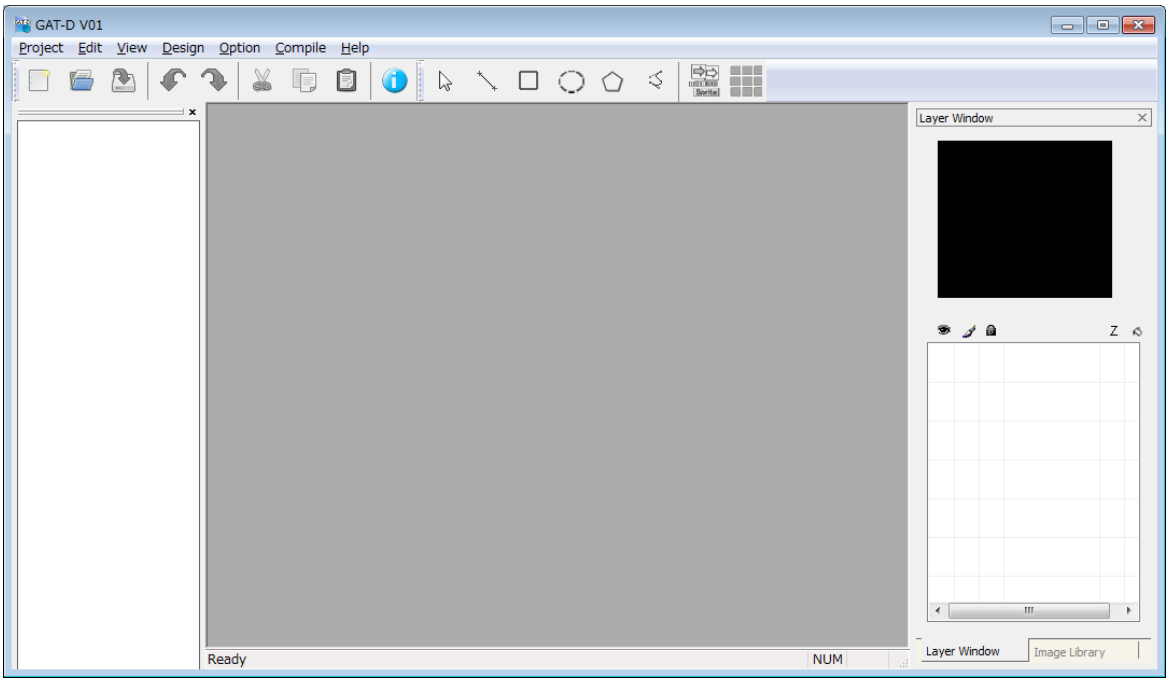
Figure 3-1. Typical Workflow



## 3.1 GAT-D Startup

When GAT-D is launched, the startup screen appears as shown in Figure 3-2.

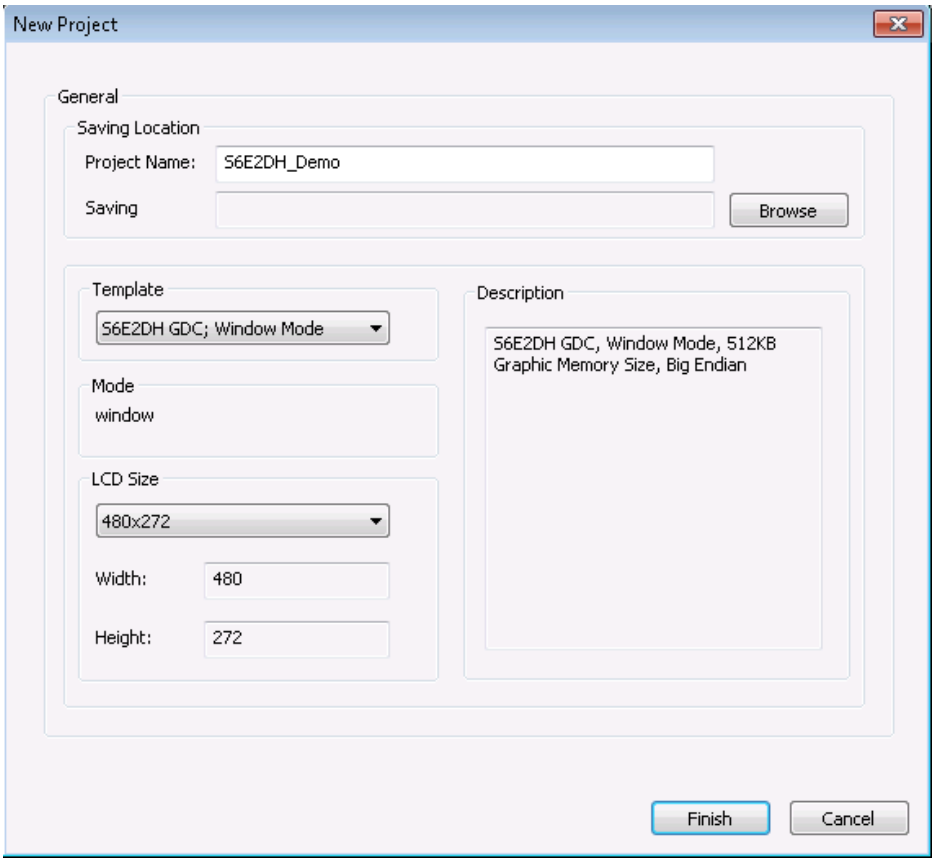
Figure 3-2. Startup Screen



## 3.2 Creating a New Project

To create a new project, choose **Project** > **New**. The **New Project** dialog appears as shown in Figure 3-3. Enter the **Project Name** and select the **Saving Location**. Select the **LCD Size**.

Figure 3-3. New Project Dialog



## 3.3 Creating a New Page

To create a new page, right-click on the Project Explorer and select **New Page** as shown in Figure 3-4. The new page opens in GAT-D as shown in Figure 3-5.

Figure 3-4. New Page

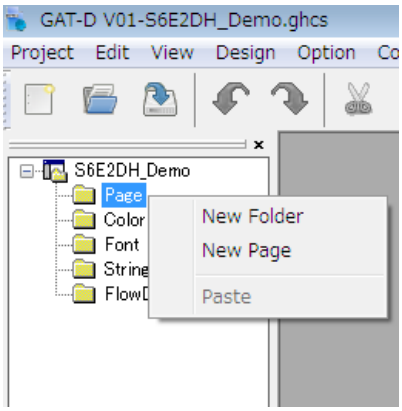
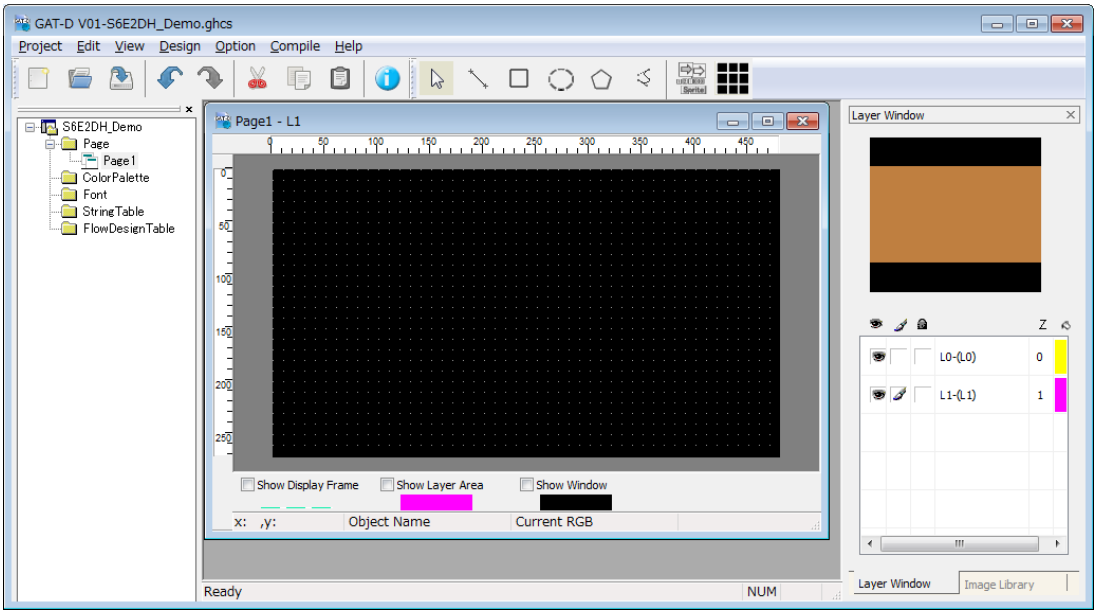



Figure 3-5. New Page Open



## 3.4 Adding an Image to the Image Library

To add an image to the Image Library, select the **Image Library** tab as shown in Figure 3-6. Right-click on the **Image Library**, select **Add New Image** from the context menu, and select the image to add when the file dialog box opens.

The image is added to the image library as shown in Figure 3-7.

Figure 3-6. Add New Image

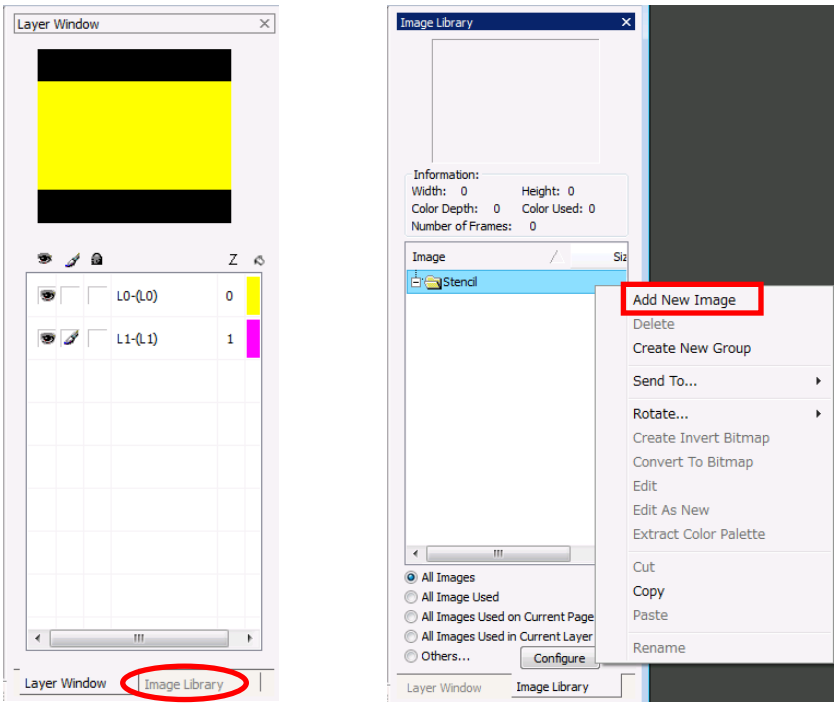
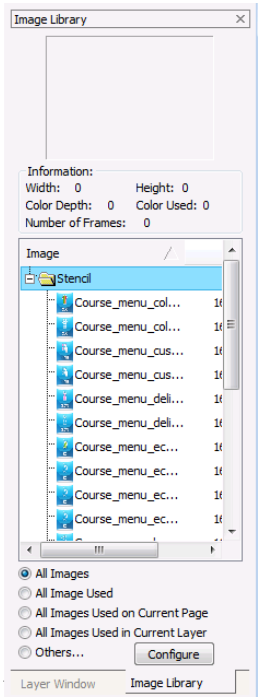



Figure 3-7. Image Library



## 3.5 Adding a Window

To add a window, select the Window icon in the drawing bar and drag it to the working area as shown in Figure 3-8, where ① is the window drawing button, ② is the window top-left point, and ③ is the window bottom-right point.

An empty window is added to the current layer (see Figure 3-9).

Figure 3-8. Creating a Window

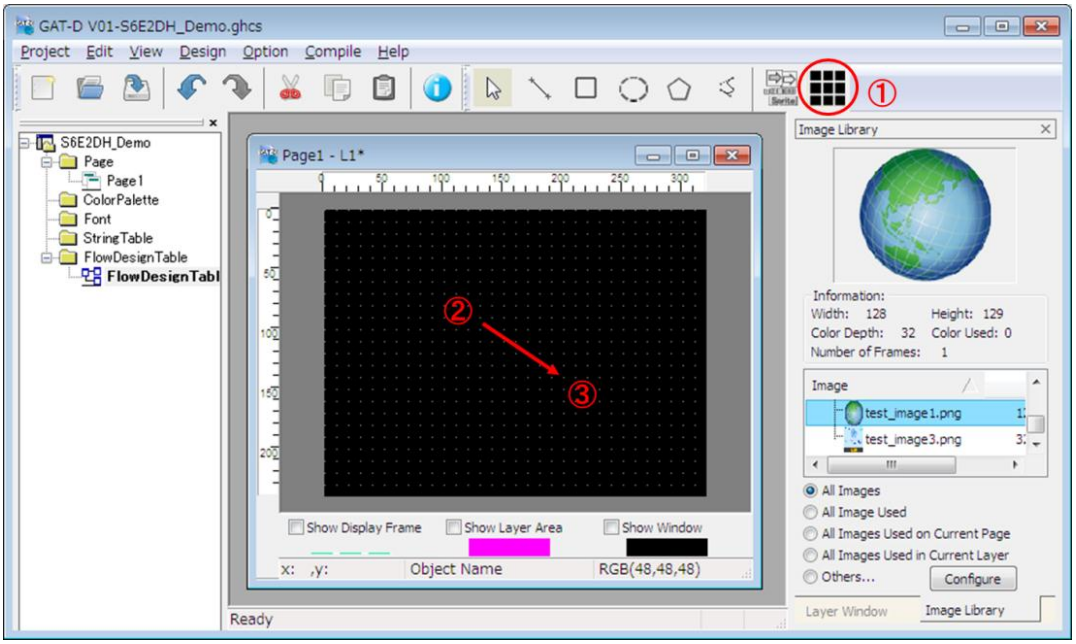
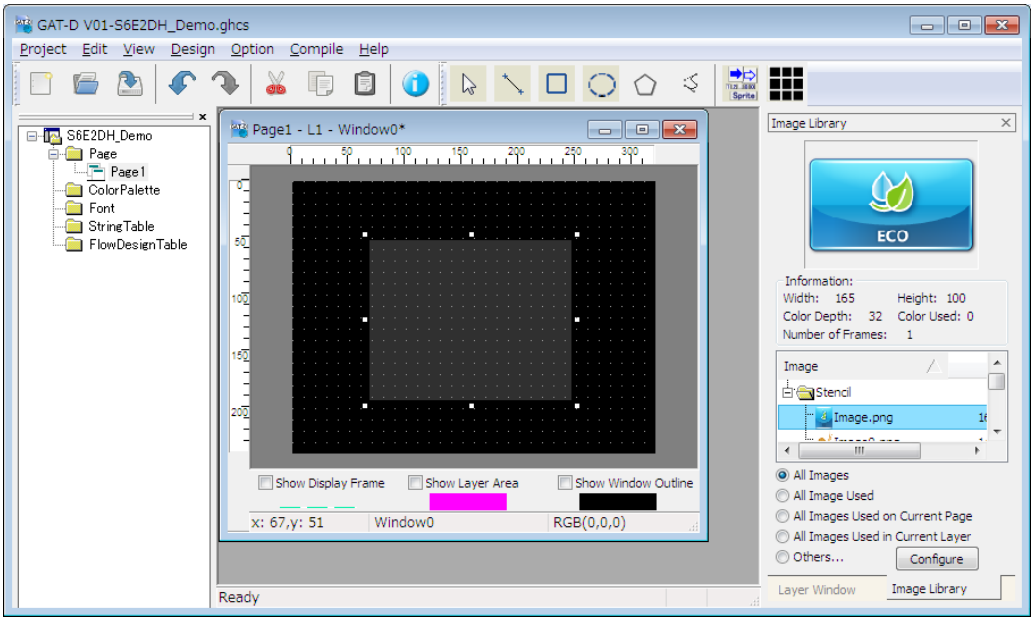


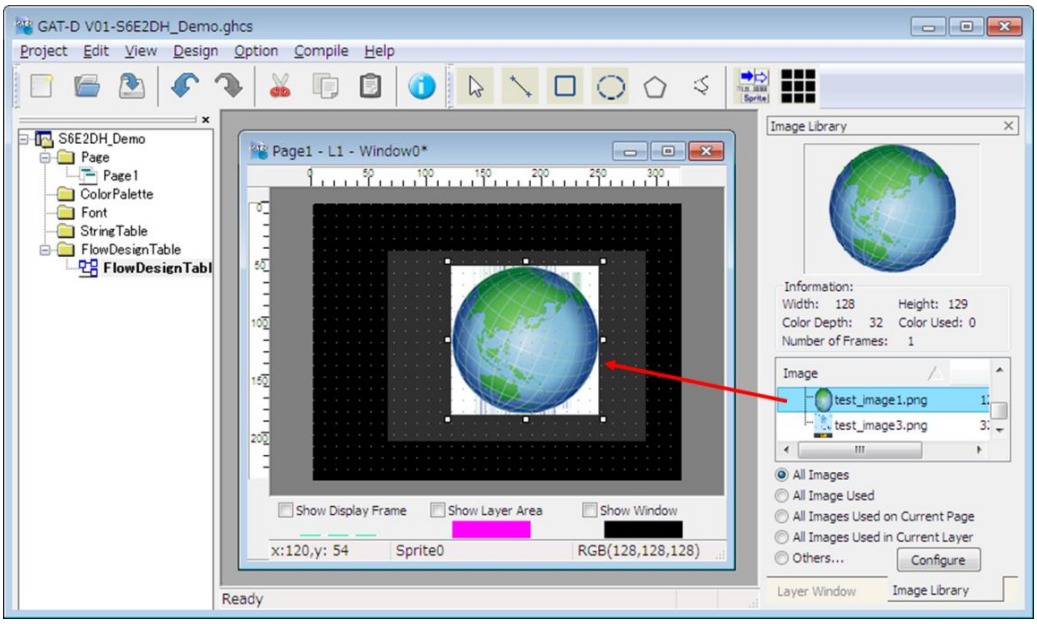

Figure 3-9. Created Window



## 3.6 Creating an Image Sprite Object

To create an image sprite object, select the window for adding a sprite object on the Page. Then drag and drop the image from the Image Library to the Page, as shown in Figure 3-10.

Figure 3-10. Dragging Image to Sprite Object




## 3.7 Setting a Sprite Object

A sprite object is set as a basic sprite by default. Properties of a sprite object can be changed in the Properties dialog. Its dialog can be called by selecting **Properties…** in the context menu of a sprite object. It can be called by double-clicking a sprite object on the working area too.

See Sprite Object for details on each tab in the GUI.

## 3.8 Flow Design and Simulation

Flow design provides definitions for displaying a page and is composed of an “action” and an “event”. See Flow Design for details.

To create a new Flow Design Table, select the **New Flow Design** in the context menu (Figure 3-11). **Flow Design** dialog appears. Then, click the **Action Table** tab on the dialog. Add one action to the list in the upper part of the dialog, as shown in Figure 3-12 ①. Then, the name of the action can be set in the **Action** column, as shown in Figure 3-13 ②. Select the targeted Page in the Page column as shown in Figure 3-13 ③.

Figure 3-11. New Flow Design

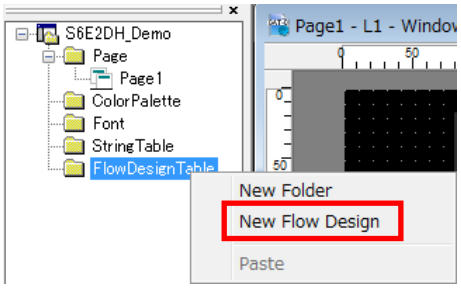
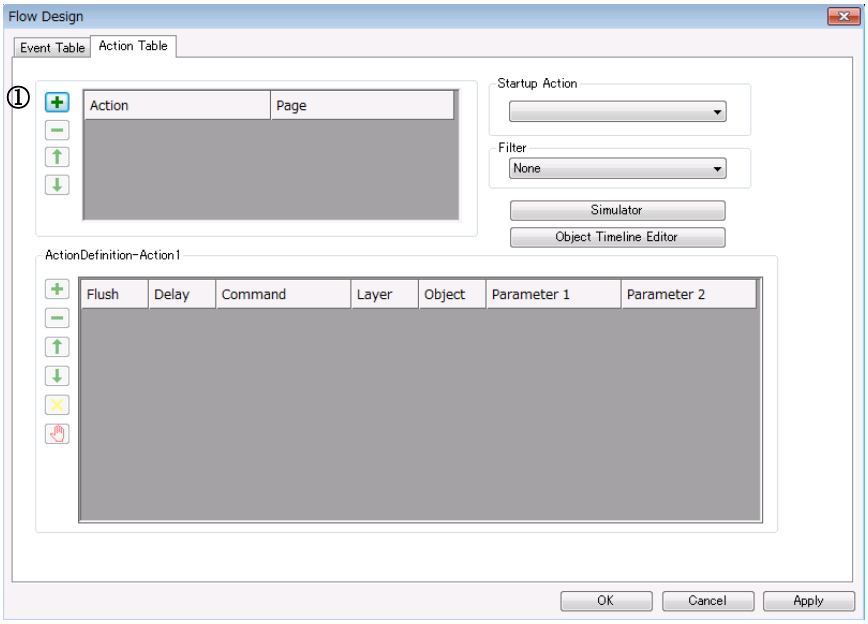
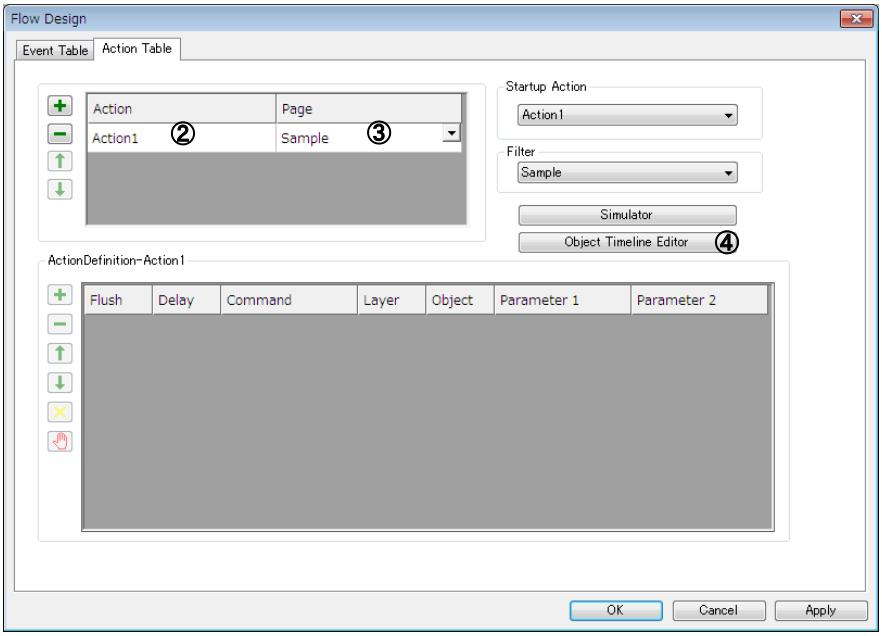



Figure 3-12. Action Table for Adding an Action



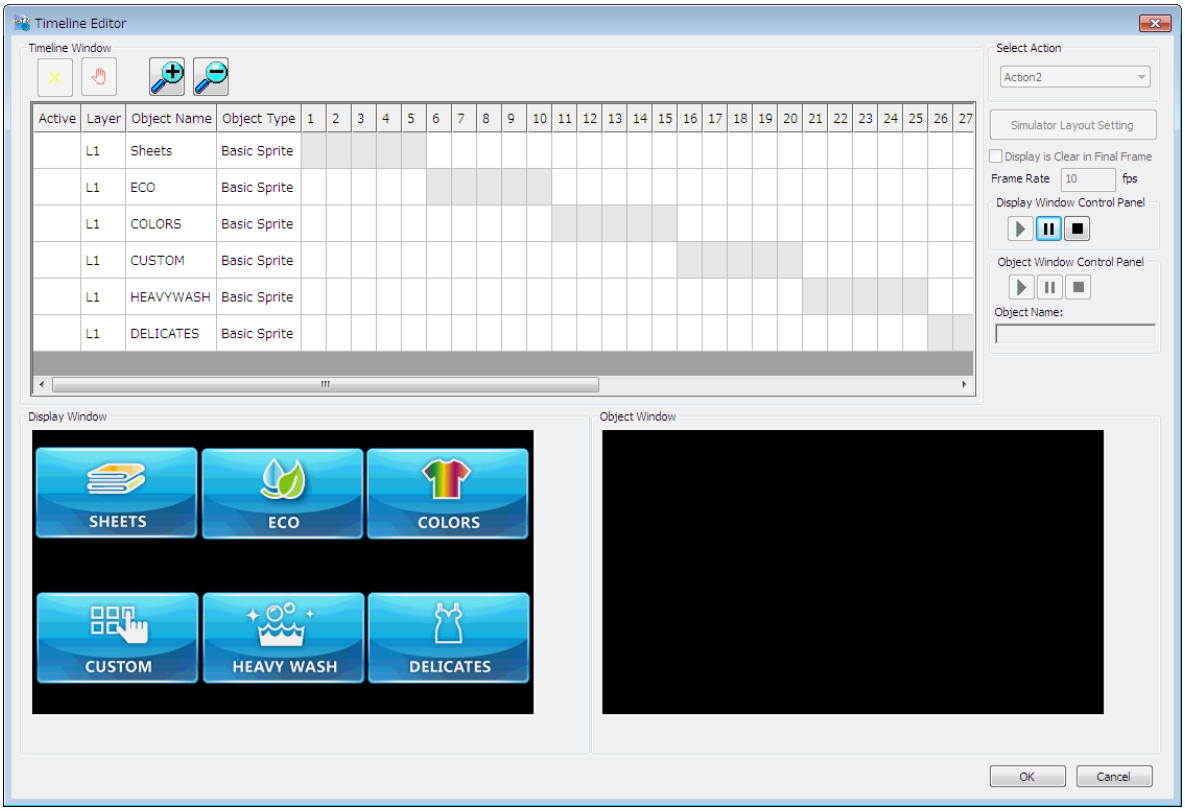

.

Figure 3-13. Action Table




When you click the Object Timeline Editor in the Action Table tab as shown in Figure 3-13 ④, the Timeline Editor dialog appears as shown in Figure 3-14. In this dialog, the display definition of each object is set by frame unit. See Object Timeline Editor for details.

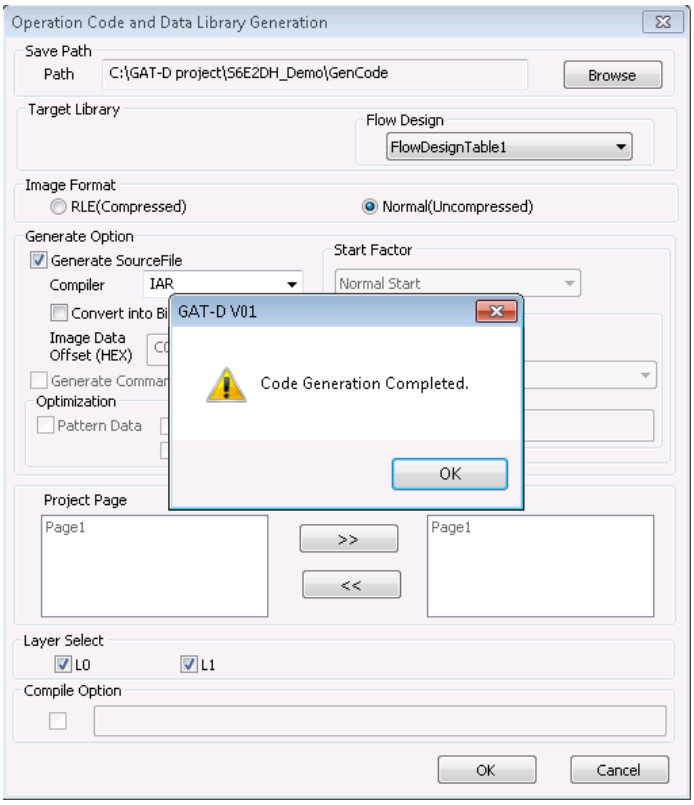
Figure 3-14. Timeline Editor



## 3.9 Code Generation

Choose **Compile** > **Resource** to open the Operation Code and Data Library Generation dialog box. Keep the default settings and click **OK**. The code will be generated and the information box displaying Code Generation Completed will appear as shown in Figure 3-15.

Figure 3-15. Code Generation



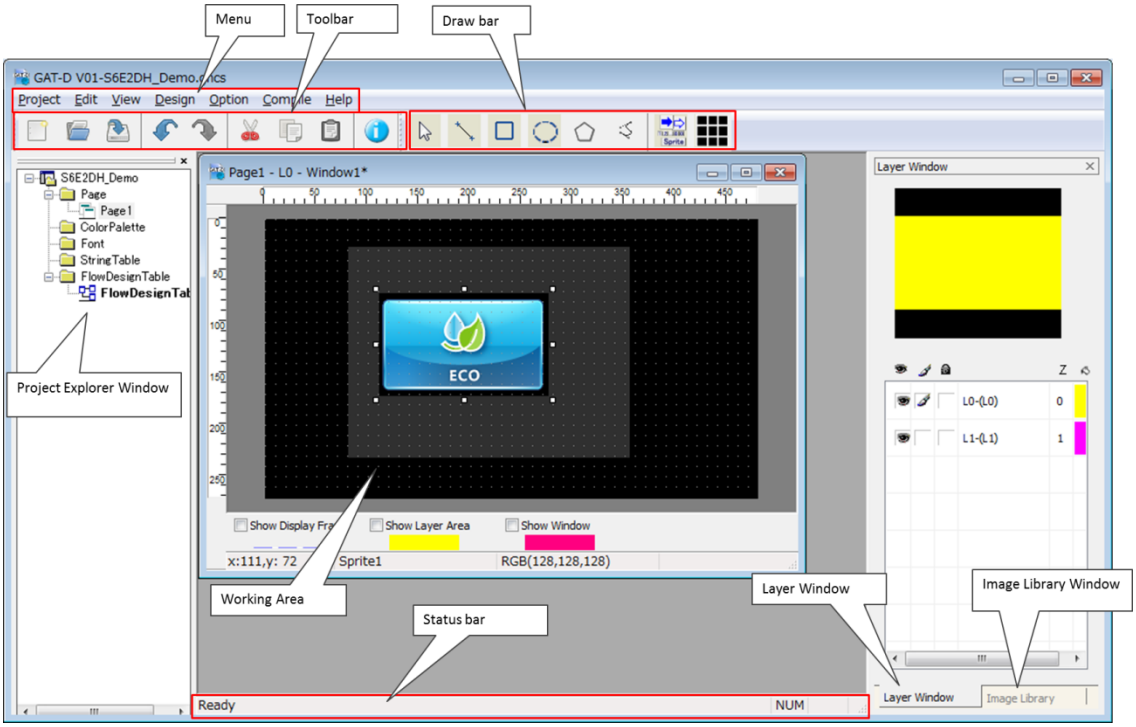
# 4. Operation Interface

## 4.1 Project Main Picture

Figure 4-1 shows the main picture of the GAT-D application. Its framework is divided into eight parts: menu, toolbar, draw bar, Project Explorer, Image Library, Layer Window, status bar, and working area. In addition, it has three auxiliary dialogs: Object Browser, Preview Window, and Memory Information.

GAT-D will select the default display language based on the language used in the Windows system. This will be set at initial startup only. GAT-D supports English and Japanese. If the Windows system uses a language other than English or Japanese, GAT-D will select English as the default language. In addition, you need to restart GAT-D after changing the display language at View > Language.

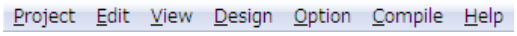
Figure 4-1. Main Picture



## 4.2 Project Menu Bar

The menu bar of the GAT-D application includes Project, Edit, View, Design, Option, Compile, and Help.

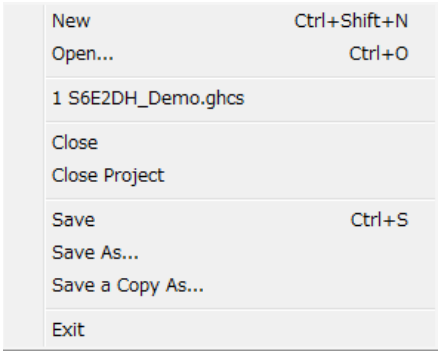
Figure 4-2. GAT-D Menu Bar




### 4.2.1 Project

The **Project** menu includes New, Open, Recent Project Opened, Close, Close Project, Save, Save As, Save a Copy As, and Exit.

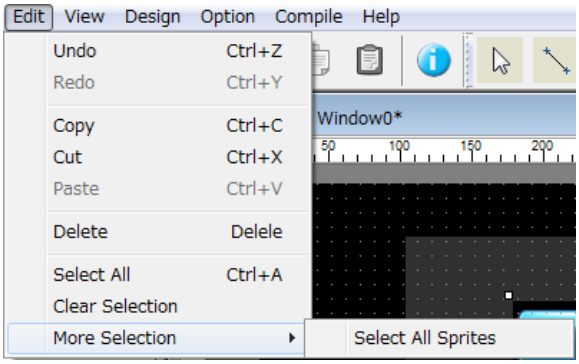
Figure 4-3. Project Menu




### 4.2.2 Edit

The Edit menu includes Undo, Redo, Copy, Cut, Paste, Delete, Select All, Clear Selection, and More Selection, which contains Select All Sprites.

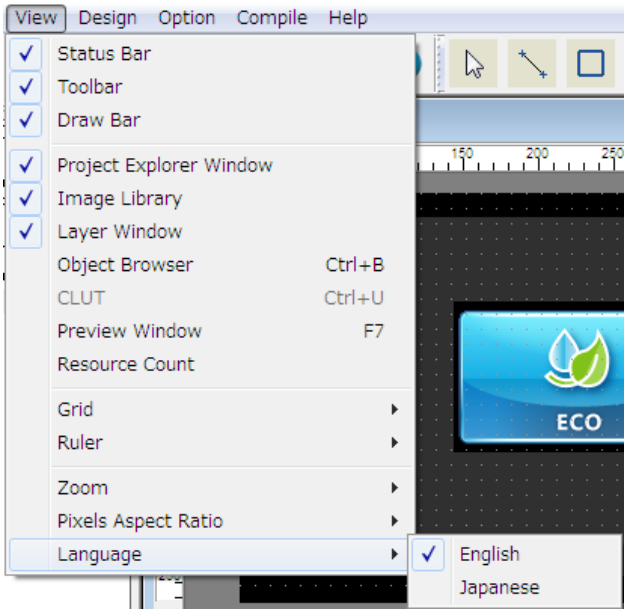
Figure 4-4. Edit Menu



### 4.2.3 View

Status Bar, Toolbar, Draw Bar, Project Explorer, Image Library, and Layer Window in the View menu are flags for displaying / not displaying on the main picture.

Figure 4-5. View Menu




**Object Browser** calls the dialog for the Object Browser. See Object Browser.

**Preview Window** calls the dialog for previewing each page. See Preview Window.

**Resource Count** calls the dialog for memory information. See Memory Information.

**Grid** > **Visible** indicates whether the grid line is displayed in the working area as shown in the left-hand side of Figure 4-6.

**Grid** > **Grid Setting** calls the dialog for setting the spacing of grids in the working area as shown in the right-hand side of Figure 4-6.

**Ruler** > **Visible** indicates whether the ruler is displayed in the working area as shown in Figure 4-7.

**Zoom** is used to select the zooming factor of the display as shown in Figure 4-8.

**Pixels Aspect Ratio** enables you to manage the aspect ratio in the working area as shown in Figure 4-9.

- **New…**

  Create a new pixels aspect ratio (PAR) with the setting name and factor, which is the aspect ratio.

- **Delete**

  Delete the existing PAR.

- **Edit**

  Edit the parameters of the existing PAR.

  **Note:** The PAR selection will be applied to the whole project. The selected PAR will be marked with a checkmark (√).

**Language** is used to select the display language of the GAT-D interface.

**Note:** Restart GAT-D after changing the display language.

Figure 4-6. Grid

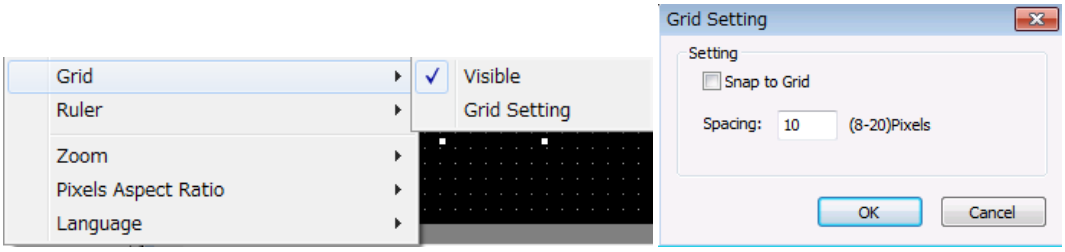



Figure 4-7. Ruler

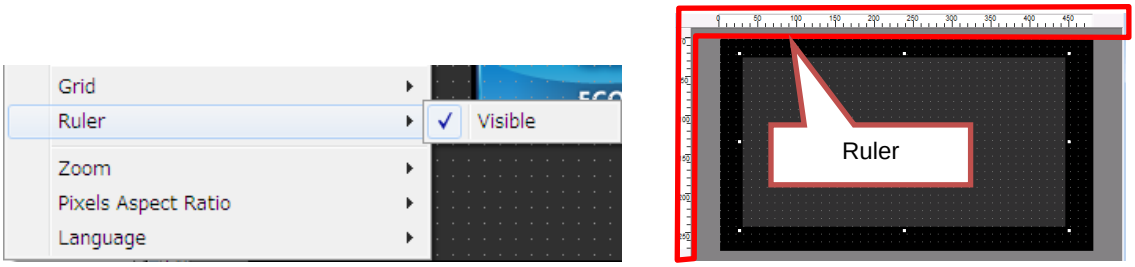
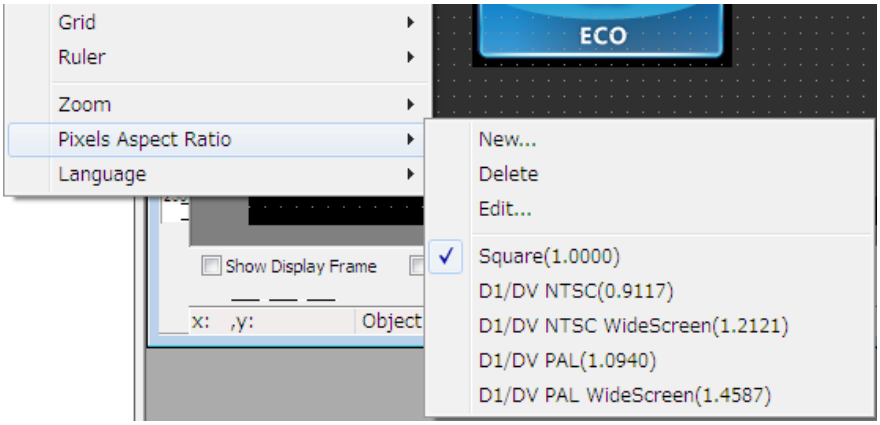



Figure 4-8. Zoom




Figure 4-9. Pixels Aspect Ratio



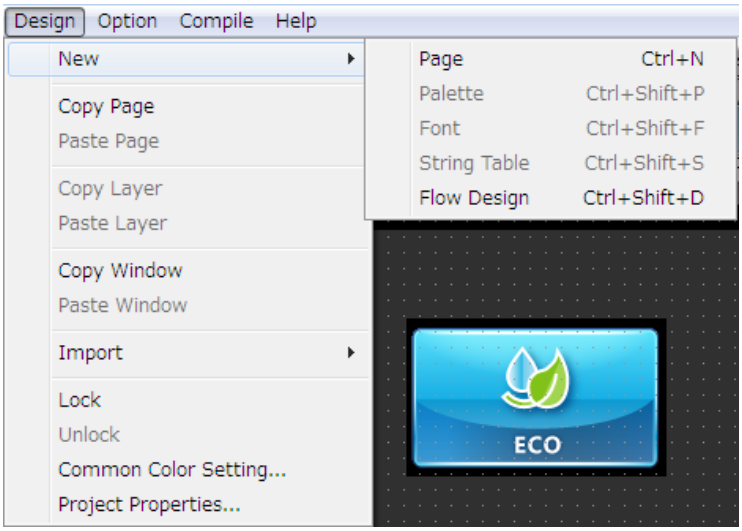
### 4.2.4 Design

The Design menu includes New, Copy Page, Paste Page, Copy Layer, Paste Layer, Copy Window, Paste Window, Import, Lock/Unlock, Common Color Setting, and Project Properties.

In addition, the **New** menu contains **Page** and **Flow Design**.

Note that **Palette, Font,** and **String Table** are disabled in GAT-D V0.1 SP1.

Figure 4-10. Design




**Copy Page** and **Paste Page** are operations for copying and pasting a page. See Page for details.

**Copy Layer** and **Paste Layer** are operations for copying and pasting a layer. See Layer for details.

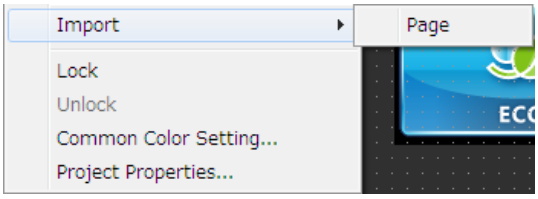
**Copy Window** and **Paste Window** are operations for copying and pasting a window. See Window for details.

**Import** > **Page** (Figure 4-11) is used to import a PSD file image to the Image Library of the project. See Page for details.

**Common Color Setting** is used to set the global color setting used in the project. See Common Color Setting for details.

**Project Properties…** contains the project parameters. See Project Property for details.

Figure 4-11. Import > Page



### 4.2.5 Option

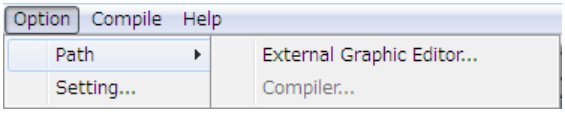
The Option menu includes Path and Setting…. Options. The Path > External Graphic Editor… option sets the external editor tool for editing the image(s) in the Image Library. See Image List for details.

**Note:** External editor tool is the image editing software such as Microsoft Paint software of Windows.

**Path** > **Compiler…** is disabled.

**Setting…** calls the dialog for setting auto save and the frame on the work area. See Setting Window for details.

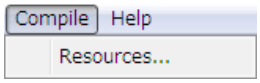
Figure 4-12. Option




### 4.2.6 Compile

The Compile menu includes only Resources…. It is used to generate the operation code. See Code Generation for details.

Figure 4-13. Compile




### 4.2.7 Help

The Help menu includes About GAT-D V01…. It calls the dialog for the GAT-D information, which is the version number and copyright notice of GAT-D.

Figure 4-14. Help

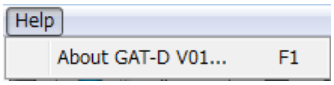
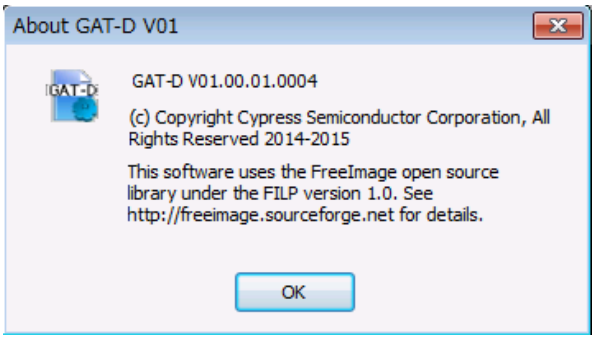



Figure 4-15. About GAT-D information




## 4.3 Project Toolbar

The toolbar includes shortcuts for common functions in the GAT-D, including New Project, Open Project, Save Project, Undo, Redo, Cut, Copy, Paste, and Help.

Figure 4-16. Toolbar



## 4.4 Project Draw Bar

The draw bar includes shortcuts for selection tool and line, rectangle, circle, sprite, polygon(*), freehand-line(*) and window drawing tools. See Object for details.

**Note:** GAT-D V01 SP1 does not support polygon and freehand-line.

Figure 4-17. Draw Bar



## 4.5 Working Area

Figure 4-18 shows the working area, which is a preview of the current layer. You can design the layout of the layer in the working area. It contains three parts: edit area, display setting area, and object status area. You can edit layers in the edit area; for example, add or delete a window and object, change layer properties, and so on. You can set the display setting by using three options: Show Display Frame, Show Layer Area, and Show Window. You can select one or more of them at the same time. The object status area shows the coordinate position, the name of the current selected object, and the RGB value of the current position for the mouse.

- **Display Setting**

  Show Display Frame: Displays the display frame

  Show Layer Area: Displays (= coloring) the layer area

  Show Window: Displays the window frame

**Notes:**

1. The working area enables you to design only one layer. It cannot show the real appearance, which is integrated into the multiple layers. To view the real appearance, use the Preview Window or run the Simulation.

   When the window's Blend Operator option is not selected, the position of a Sprite object that is located on its window is changed to top-left on its window. Note that this position change is made when the Preview Window is called or when Simulation starts.

Figure 4-18. Working Area

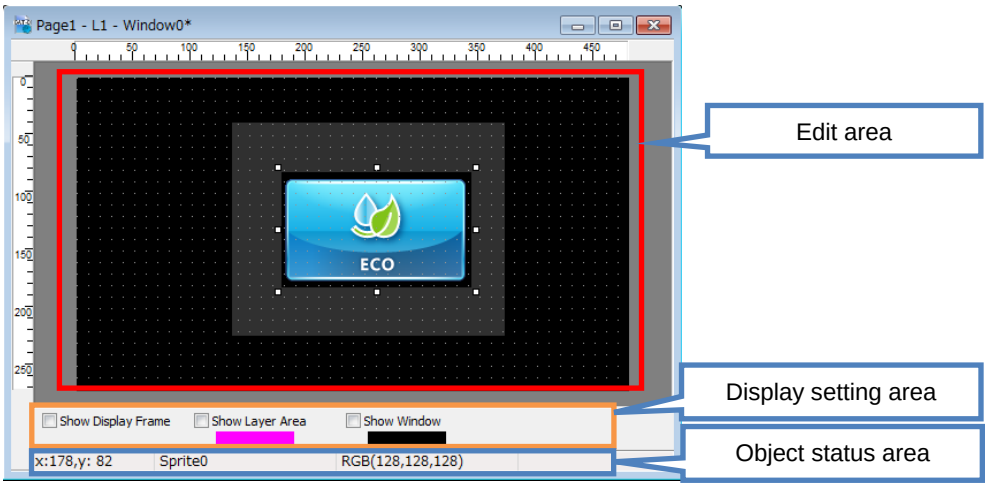
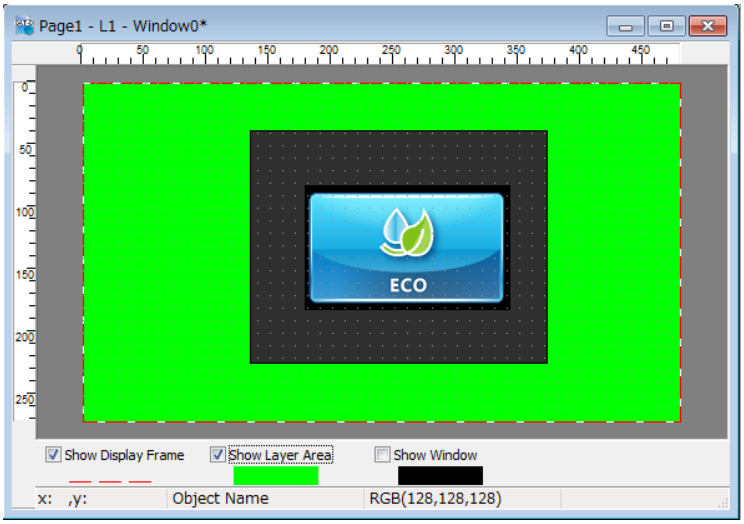



Figure 4-19 shows an example of the two options selected. The red and white dotted line represents the display area, and the green area is the layer area. The preview color for Display Frame can be changed via **Option** > **Setting**.

Figure 4-19. Display Area and Layer Area

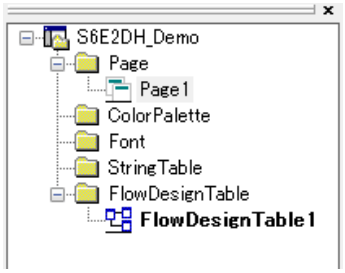



## 4.6 Project Explorer

The Project Explorer is similar to Windows Explorer. You can use it to explore and manage the folders of the current project and all resource files. The right-click menu of the Project Explorer enables editing folders and resource files.

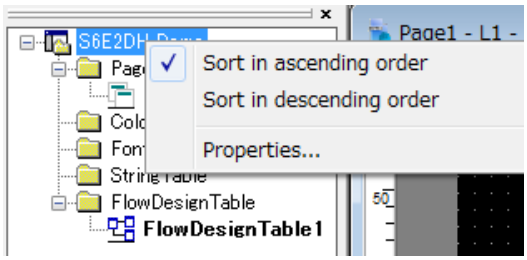
Five folders are automatically created as shown in Figure 4-20. Their folders cannot be renamed or deleted. Note that Color Palette, Font, and StringTable folders are disabled in GAT-D V01 SP1.

Figure 4-20. Project Explorer




The subfolder of each folder and the files of each folder (subfolder) within the Project Explorer can be sorted in alphabetically ascending or descending order.

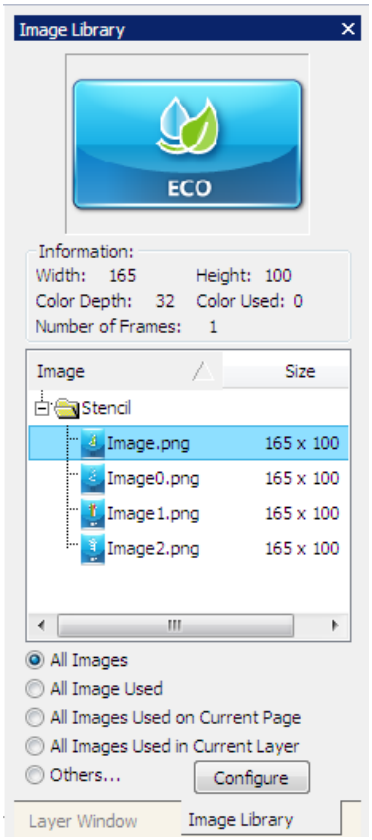
Figure 4-21. Sorting in the Project Explorer



## 4.7 Image Library

The **Image Library** menu enables you to add image files to the project. It lets you preview the image and view its properties, and group the loaded image files to edit the image file/folder with the right-click menu. See Image Library Setting for details.

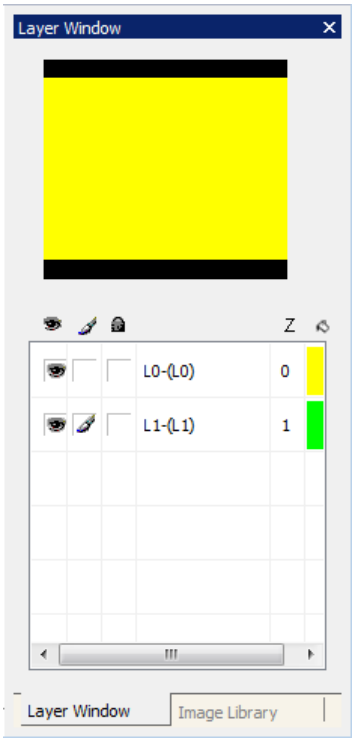
Figure 4-22. Image Library



## 4.8 Layer Window

Figure 4-23 shows the Layer Window. It is used to select the displayed layer in the working area of the Page. See Layer for details.

Figure 4-23. Layer Window

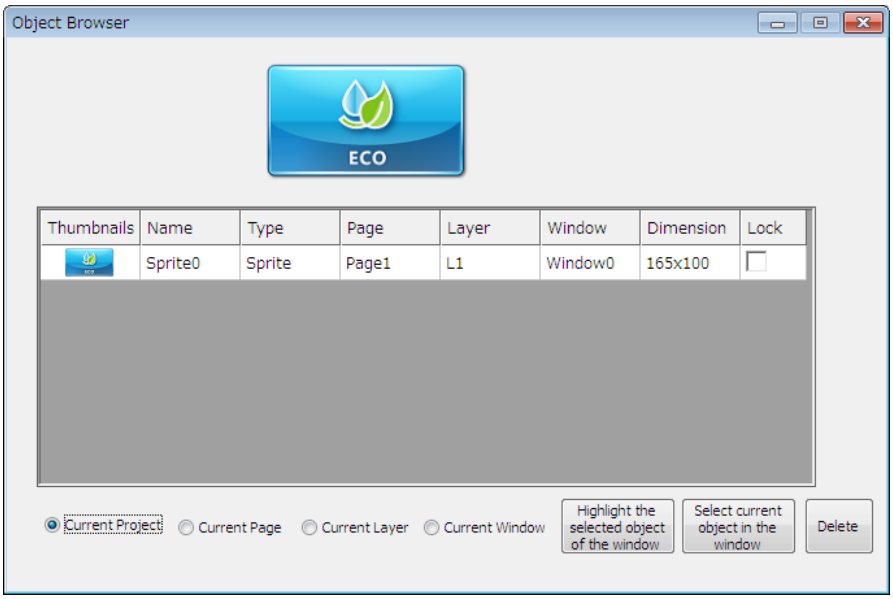


## 4.9 Object Browser

Figure 4-24 shows the Object Browser dialog which can be called via **View** > **Object Browser**. This dialog lists objects with accompanying information. Listed objects are enabled to filter by the associated page, layer, and window. Moreover, the objects can be sorted by clicking title row of the list.

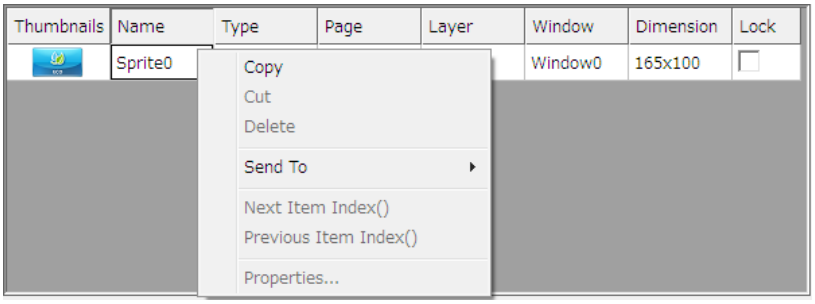
**Note:** See Object to learn the Lock column of list.

Figure 4-24. Object Browser




See Context Menu to learn the context menu as shown in Figure 4-25.

Figure 4-25. Context Menu



The viewing options for filtering are four radio buttons at the bottom-left of Figure 4-25:

- **Current Project**

Lists all objects in the project

- **Current Page**

Lists all objects in the selected page

- **Current Layer**

Lists all objects in the selected (displayed) layer

- **Current Window**

Lists all objects in the selected window. The viewing options for selected objects are three buttons at the bottom-right of Figure 4-25:

- **Highlight the selected object of the window**

The selected object column in the working area will be highlighted in the Object Browser.

- **Select current object in the window**

The selected objects in the Object Browser will be selected in the working area.

- **Delete**

The selected objects in the Object Browser will be deleted from the working area.

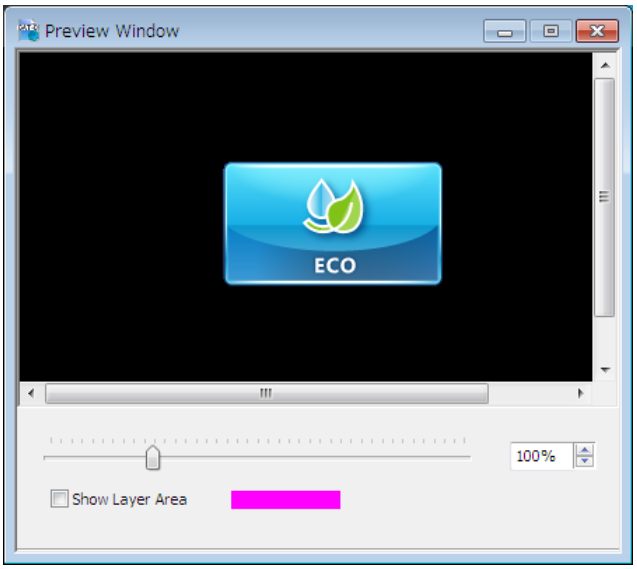
## 4.10 Preview Window

Figure 4-26 shows the Preview Window for pages. This dialog integrates multiple layers and enables you to zoom from 1% to 400%.

When you double-click on the Preview Window, it is adjusted to the LCD size. However, when the LCD width exceeds 800 or the height exceeds 600, the Preview Window cannot be automatically adjusted.

To view the Preview Window, choose **View** > **Preview Window** or press **F7**.

Figure 4-26. Preview Window



## 4.11 Memory Information

The Memory Information dialog contains three parts: the bar chart of usage, the concrete data, and the page list. The concrete data includes three items:

- **Capacity**

Maximum VRAM capacity that the hardware can offer

- **Used Space**

VRAM consumption in the current page

- **Free Space**

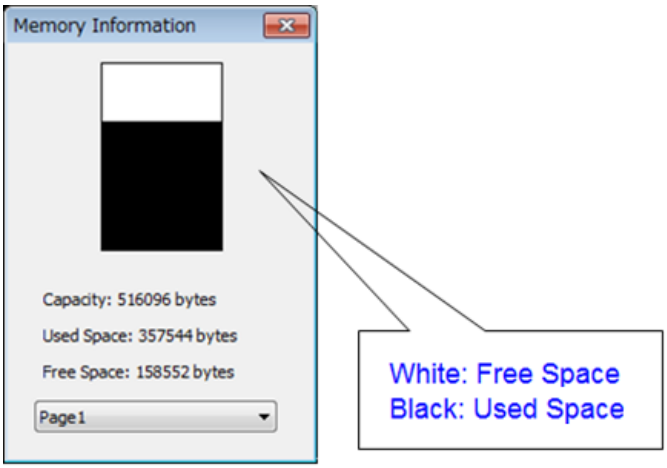
Free VRAM space in the current hardware

**Note:** GAT-D V01 SP1 offers memory information for the internal VRAM on the S6E2Dx series only. Thus, it does not display correctly when user expands VRAM with the using Hyper-RAM etc.

Select a different page from the page list to see the VRAM usage of a different page.

To view the Memory Information dialog, choose **View** > **Resource Count.**

Figure 4-27. Memory Information Dialog



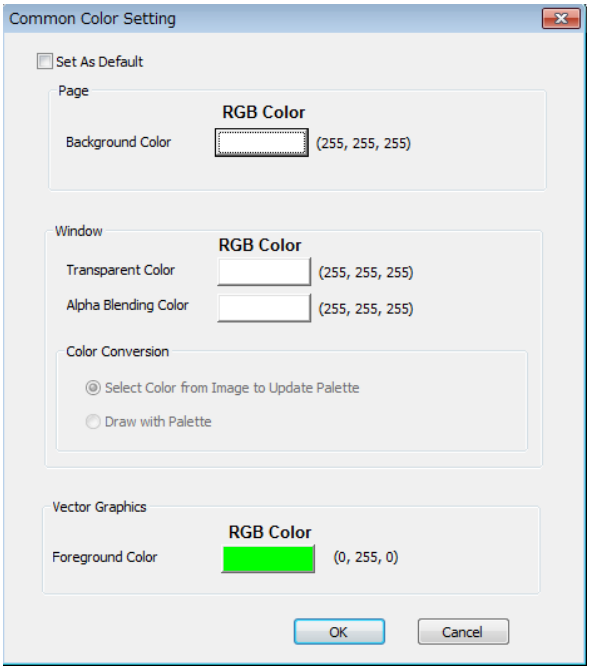
## 4.12 Default Settings

The Page background color, Window transparent color, and Window alpha blending color are the default settings in a project. To select the default settings in a project, use the Common Color Setting dialog and Setting dialog.

### 4.12.1 Common Color Setting

The Common Color Setting dialog can be used to select the color value and color conversion method in the project. To view the Common Color Setting dialog, choose **Design** > **Common Color Setting**.

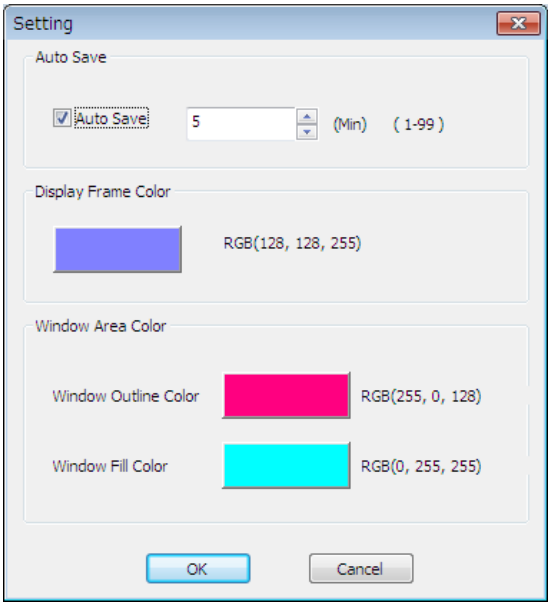
Figure 4-28. Common Color Setting Dialog



### 4.12.2 Setting Window

The options in the Setting dialog are Auto Save, Display Frame Color, and Window Area Color. To view the Setting window, choose **Option** > **Setting**.

Figure 4-29. Setting Window



# 5. Design and Use

This chapter describes the GAT-D functions in detail.

## 5.1 Introduction

GAT-D includes the following functions:

- Project
- Image Library Setting
- Page Design
- Flow Design
- Simulation
- Code Generation

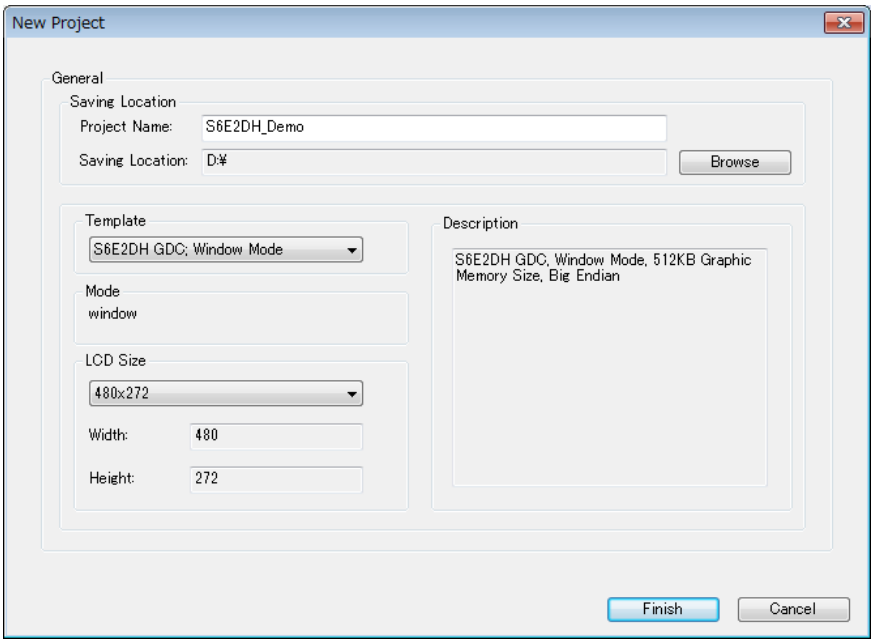
## 5.2 Project

This supports operations to create/open/close/save/save as a project and to set the project properties.

### 5.2.1 New Project

You can create a new project via **Project** > **New** or the shortcut ( ) in the toolbar.

Figure 5-1. New Project Dialog




**Note:** Selection of the Template affects the Memory Information displayed on GAT-D. Template lists only the S6E2DH series. When using the S6E2D3/5/F series, use the template for the S6E2DH series.

- **Project Name**

This is name of a new project and is required

- **Saving Location**

Saving a path for the new project is required. You can select it from Windows Explorer by clicking the **Browse** button.

- **Template**

This is the template used by the new project. The current template is used as the default.

- **Mode**

This is screen mode at startup. Only window mode is supported.

- **LCD Size**

This is the display size of the Page. Select the size from the pull-down list. If you select the custom item, you may enter the free size for LCD in **Width** and **Height** boxes.

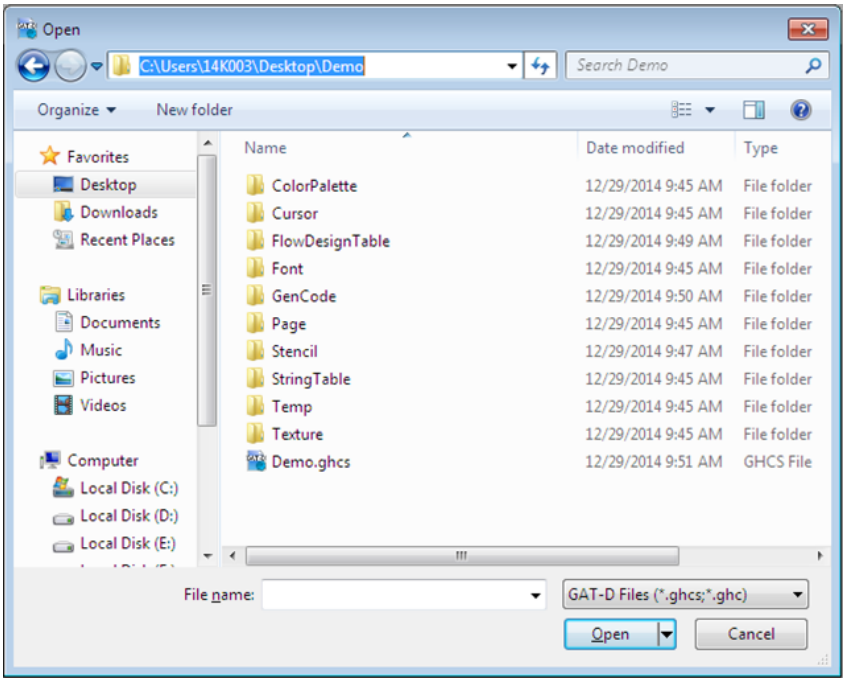
- **Description**

This is the information for a current GDC.

### 5.2.2 Open

You can open an existing project via **Project** > **Open** or the shortcut (  ) in the toolbar.

Figure 5-2. Open Dialog




### 5.2.3 Close Page

You can close the current page in a project via **Project** > **Close**.

### 5.2.4 Close Project

You can close the current project via **Project** > **Close project**.

**Note:** If the project is not saved, GAT-D provides an alert.

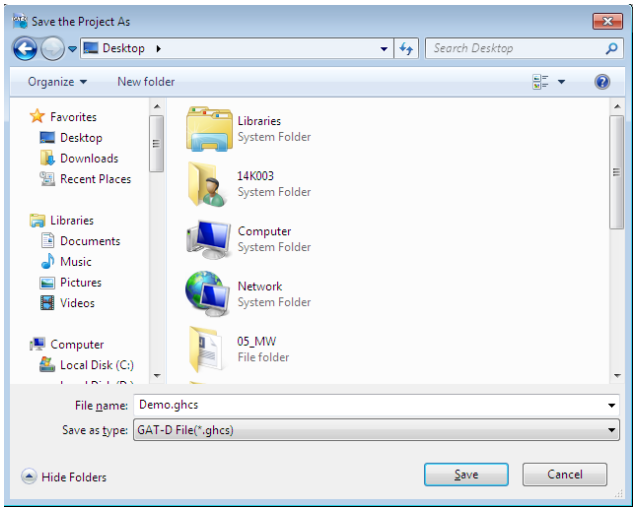
### 5.2.5 Save

You can save the current project via **Project** > **Save** or the shortcut (  ) in the toolbar.

### 5.2.6 Save As

You can save the current project to another location via **Project** > **Save As**.

Figure 5-3. Save As the Project



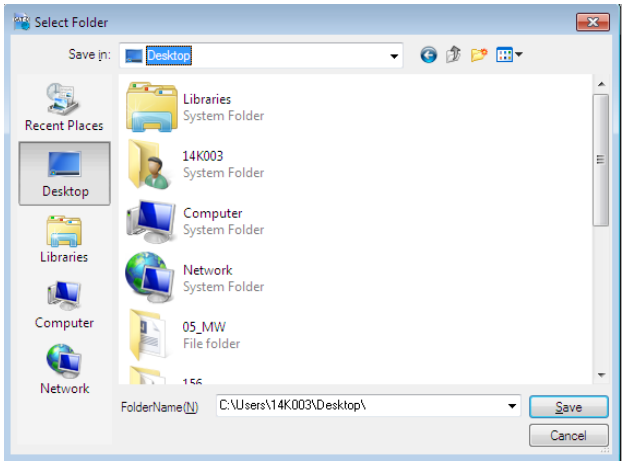

Select the path, name the project, and click **Save.**

**Note:** The path for Save As should not be the folder of the current project or its subfolder. If it is, the project cannot be saved.

## 5.2.7 Save a Copy As

You can save the current project as another project folder via **Project** > **Save a Copy As**.

Figure 5-4. Select Folder Dialog




Select the path and click **Save** to finish in Windows Explorer.

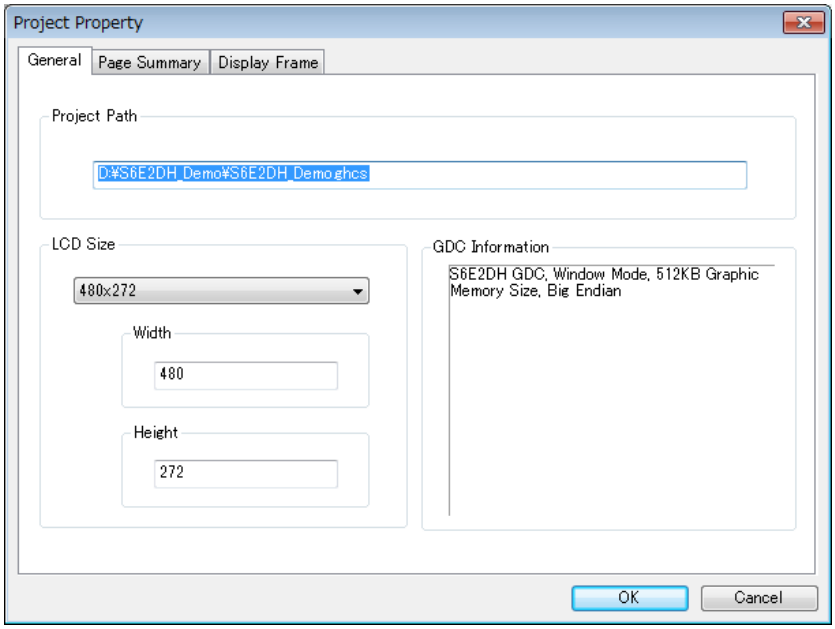
**Note:** The path for Save a Copy As should not be the folder of the current project or its subfolder. If it is, the project cannot be saved.

## 5.2.8 Project Property

You can display the Project Property dialog by choosing Design > Project Property or selecting Properties … from the context menu when you right-click on the project name in the Project Explorer. The Project Property dialog has three tabs: General, Page Summary, and Display Frame.

### 5.2.8.1 General

Figure 5-5. Project Property, General Tab




- **Project Path**

This displays the saving path for the current project files and is read-only.

- **LCD Size**

This displays the current LCD size and enables you to change it.

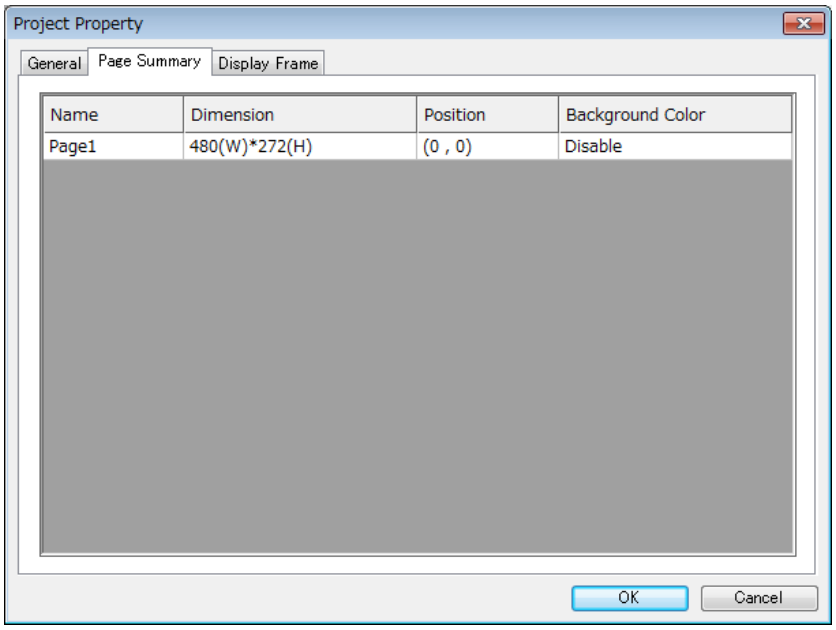
- **GDC Information**

This displays the information of the current GDC.

### 5.2.8.2 Page Summary

The Page Summary tab displays all the pages information in the current project. The information is read-only.

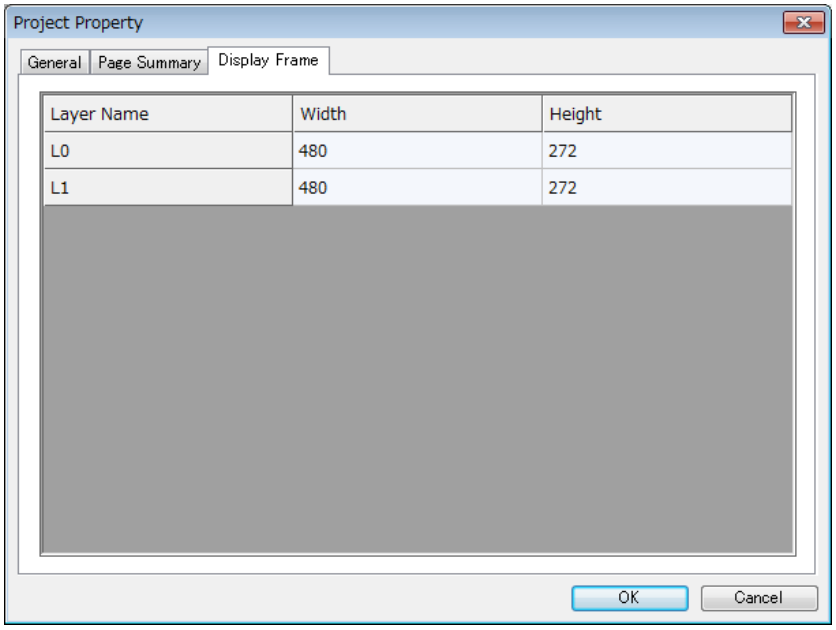
Figure 5-6. Page Summary Tab




### 5.2.8.3 Display Frame

The Display Frame tab displays the width and height of the display area. The information is read-only.

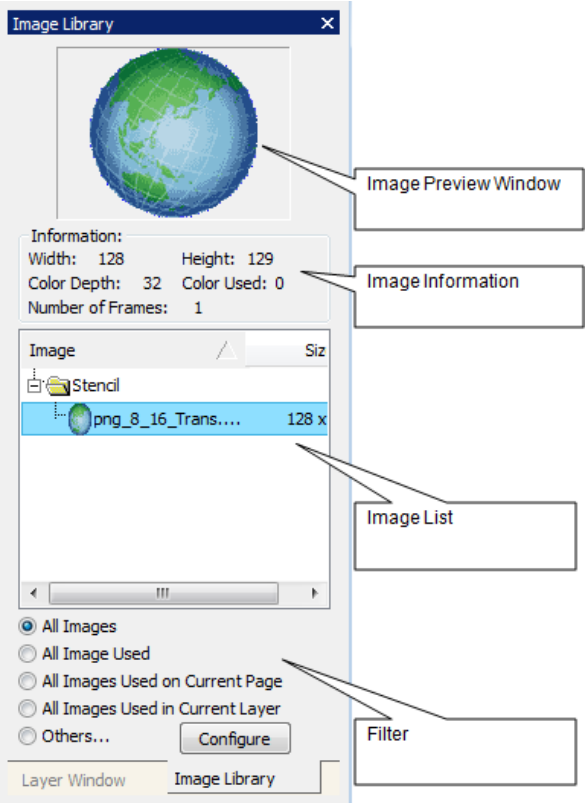
Figure 5-7. Display Frame Tab



## 5.3 Image Library Setting

This function supports loading, editing, and filtering image(s). The Image Library contains four parts: Image preview window, image information, image list, and filter. See Figure 5-8.

Figure 5-8 Image Library




### 5.3.1 Image Preview Window

This part previews the selected image in the image list. You can drag and drop the image from the image preview window into the working area.

**Note:** When the selected image is too large to display, it will automatically be scaled down to fit the preview window.

### 5.3.2 Image Information

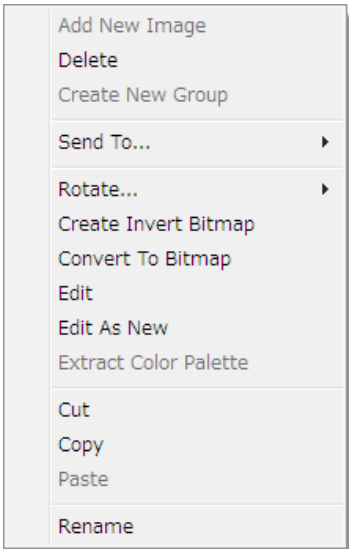
This part displays the information of the selected image in the image list. Its information includes Width, Height, Color Depth, Color Used, and Number of Frames.

### 5.3.3 Image List

This part displays the list of images loaded into the project. It includes a thumbnail, file name, and size and enables you to load an image file into the project. In addition, the list switches to ascending/descending order when you click the name column in the list.

The following are the instructions on how to manipulate the image list. When you right-click here, a menu as shown in Figure 5-9 is displayed.

Figure 5-9. Manipulation of Images




**Notes:**

1. When you select the folder icon in the image list, Add New Image and Create New Group options are available.
2. When you select the image file icon, Send To..., Rotate..., Create Invert Bitmap, Convert To Bitmap, Edit, Edit As New, Cut, Copy, Paste, and Rename options are available.
3. **Extract Color Palette** is always disabled.

- **Add New Image**

Load the image file into the image list. When you select this menu item, the dialog box for adding image files is displayed. The supported image types are BMP, JPG, GIF, PNG, and PSD.

**Note:**

1. The imported image file must be smaller than 2048 x 2048 pixels in order to convert to sprite object. See Sprite Object.
2. If loading a GIF file, each frame image in the file is stored as the independent file. If loading a PSD file, a composite image of all layers in the file is stored as BMP file, and each layer in the file is stored as independent file.

- **Delete**

Delete one or more image(s) or the folder.

**Note:** The used image(s) and the folder containing the used image(s) cannot be deleted.

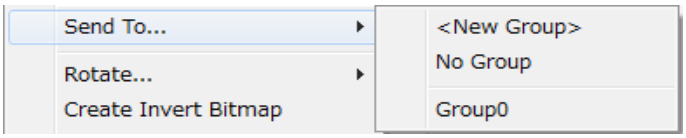
- **Create New Group**

Create a new folder for grouping image(s) in the list.

- **Send To...**

Send one or more image(s) to another group folder. It may be <New Group>, No Group, or an existing group. See Figure 5-10.

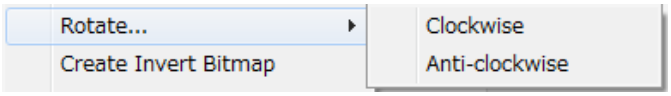
Figure 5-10. Send To…




- **Rotate...**

Rotate the image by 90 degrees based on the selected image. The direction of rotation enables you to select the options shown in Figure 5-11.

Figure 5-11. Rotate




- **Create Invert Bitmap**

Generate an inverted image of the selected image and add it to the list.

- **Convert To Bitmap**

Convert the selected image into the BMP format, and add it to the list.

**Note:** This option is not available for BMP images or multi-frame GIF images.

- **Edit**

Edit an image by calling an external image editor tool, since GAT-D does not implement the edit function.

**Note:** The default editor tool can be selected via **Option** > **Path** > **External Graphic Editor...**. If you do not set a default editor tool, GAT-D will request you to select the editor tool every time.

- **Edit As New**

After copying the selected image, edit the copied image by calling an external image editor tool.

- **Extract Color Palette**

This UI is disabled.

- **Cut/Copy/Paste**

These commands relating to existing image(s) can be used within or between projects**.**

- **Rename**

Rename the image and the group folder.

**Note:** The name must be a combination “a-zA-Z_”. However, first character must not use “0-9_”. Max number of characters is 30.

### 5.3.4 Filter

The filter settings filter the images displayed in the **Image Library**. There are five types of filtering (radio button):

- **All Images**

No filtering

- **All Images Used**

Displaying only the used image(s) in the project

- **All Images Used on Current Page**

Displaying only the used image(s) on the selected page

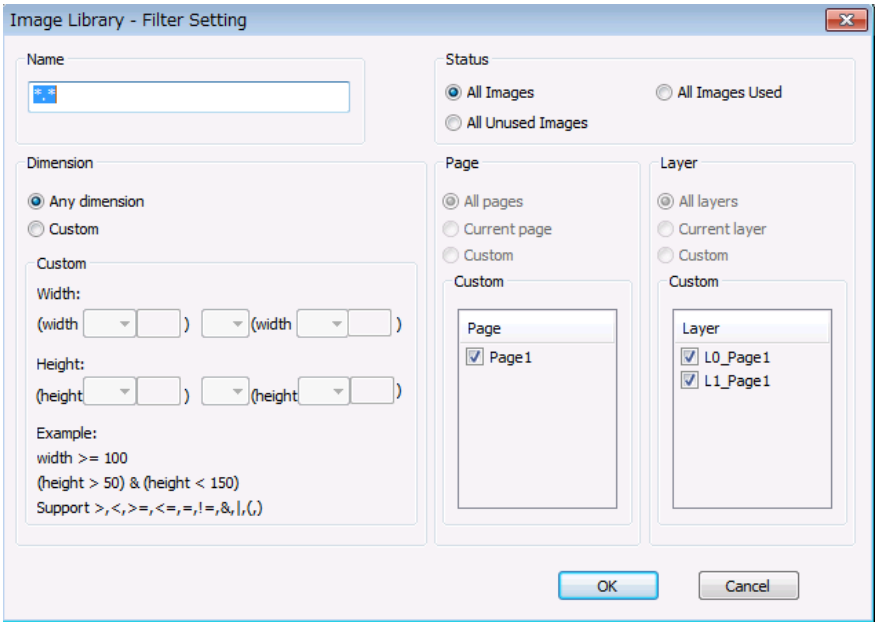
- **All Images Used in Current Layer**

Displaying only the used image(s) in the selected layer

- **Others…**

This customizes the filter. Customizing setting can be set in the **Filter Setting** dialog as shown in Figure 5-12, which is called when pushing Configure button.

Figure 5-12. Filter Setting



- **Name**

Enter the name or type of image for filtering.

- **Dimension**
  - **Any dimension**: The dimension does not use filtering.
  - **Custom**: Set the dimension for filtering.
- **Status**

This sets the rough filter.

- **All Images**: Does not use the rough filter.
- **All Images Used**: Unused images are filtered out.
- **All Unused Images**: Used images are filtered out.

**Note:** When you select **All Images Used**, the Page and Layer parts are available to set.

- **Page**

This sets the page-level filter.

- **All pages**: All image files used in any page file are extracted.
- **Current page**: All image files used in the current page are extracted.
- **Custom:** All image files used in the selected pages are extracted.

- **Layer**

This sets the layer-level filter.

- **All layers**: All image files used in any layer are extracted.
- **Current layer**: All image files used in the current layer are extracted.
- **Custom**: All image files used in the selected layers are extracted.

### 5.3.5 Supported Image Formats

GAT-D supports the image formats listed in Table 5-1.

Table 5-1. Image Formats

| Image Format |
|---|
| BMP |
| JPEG |
| GIF |
| PNG |
| PSD |

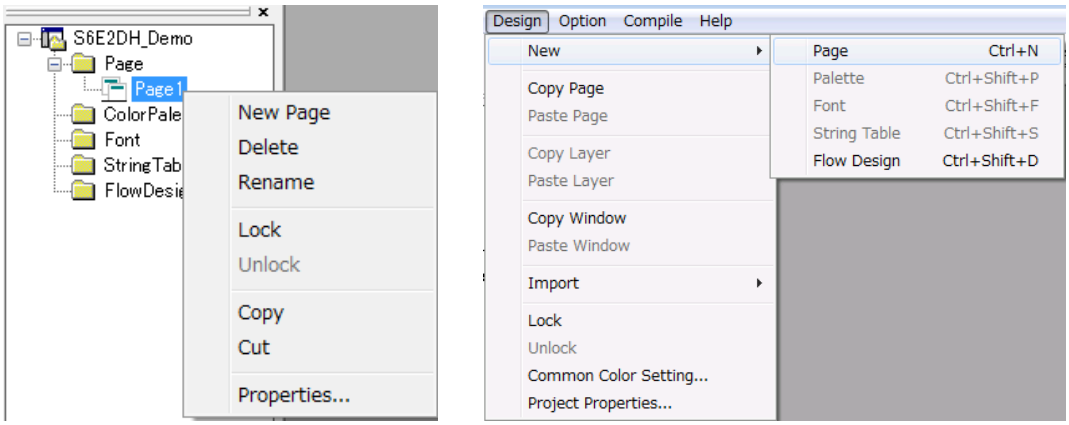
## 5.4 Page Design

This function supports create/set Page, Layer, Window, Sprite, and Vector graphics.

### 5.4.1 Page

The Page is handled from the menu that appears when you right-click on the Project Explorer or choose **Design** > **New Page** in the menu bar, as shown in Figure 5-13.

Figure 5-13. Menu for Page




- **New Page**

When you select **New Page** or choose **Design** > **New** > **Page**, the new page is created in the Page folder on the Project Explorer.

- **Delete**

When you select **Delete**, the selected page is deleted from the project.

- **Rename**

When you select **Rename**, the selected page can be renamed.

**Note:** The name must be a combination “a-zA-Z_”. However, first character must not use “0-9_”. Max number of characters is 30.

- **Lock**

When you select **Lock**, the configuration of the selected page is locked. Locking the page also locks the Layer, Window, and Object on it at the same time.

- **Unlock**

When you select **Unlock**, the configuration of the selected page is unlocked. However, the Layer, Window, and Object which belong the selected page are held the locked status.

- **Copy**

When you select **Copy**, the selected page is copied.

- **Cut**

When you select **Cut**, the selected page is cut.

- **Paste**

After you execute **Copy** or **Cut,** the **Paste** command is enabled.

**Note**: A resource file can be pasted only to a folder of its own type. Thus, a page file can be pasted only to a page folder or its subfolder. The Paste command in the context menu of other folders will be disabled.

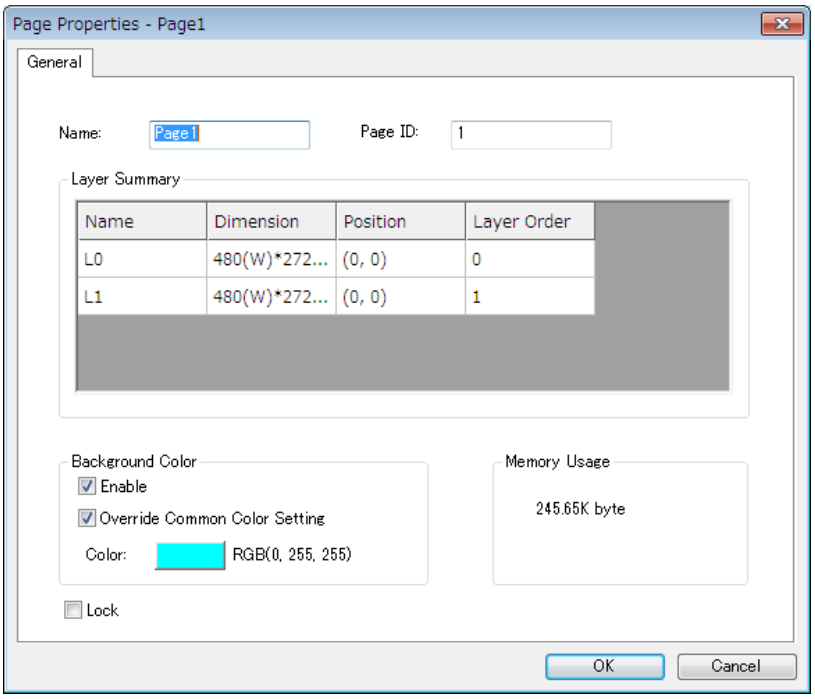
- **Properties**

When you select **Properties…**, the Properties dialog of the selected page is displayed. The Page Properties dialog contains one tab: General.

### *5.4.1.1 Properties*

Figure 5-14 shows the Page Properties dialog.

Figure 5-14. Page Properties Dialog




- **Name**

The name of the current page is editable.

- **Page ID**

The page ID of the current page is not editable.

- **Layer Summary**

This is basic information that pertains to all layers in the current page.

- **Background Color**

This is the background color of the current page.

- **Memory Usage**

This displays the memory usage of the current page.

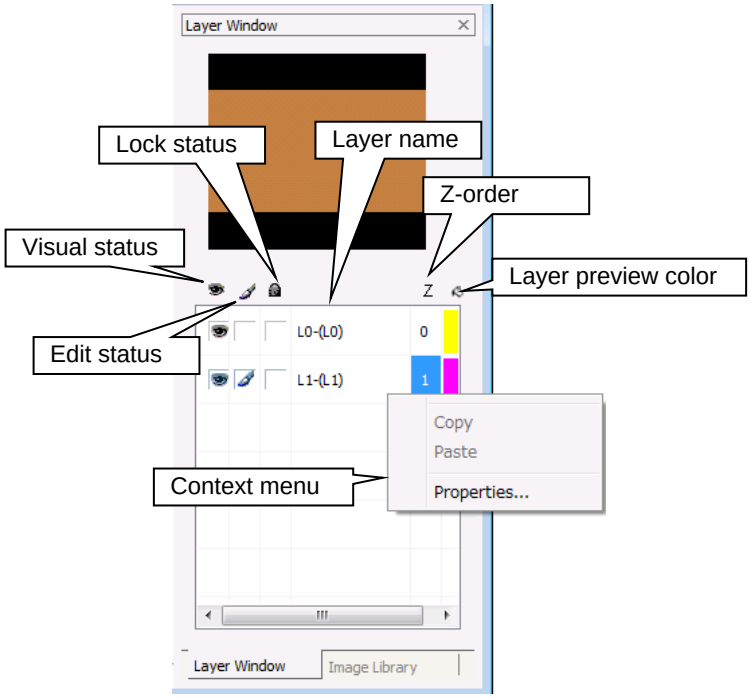
- **Lock**

This option locks the page. Nothing on the page can be changed until the page is unlocked.

### 5.4.2 Layer

The Layer Window has six columns: visible status, edit status, lock status, layer name, current Z-order, and layer preview color. The parameters of each layer are set in Properties… of the context (right-click) menu. Moreover, double-clicking on the layer name or layer color enables you to change them.

Figure 5-15. Layer Window




- **Visual status**

Double-click the icon ( ) in the Layer Window to show or hide the layer of the current page.

- ☐ : The layer is shown.
- ☐ : The layer is hidden.

**Note:** A layer cannot be hidden while it is being edited.

- **Edit status**

Double click the icon ( ) to edit the layer.

- ☐ : The layer can be edited.
- ☐ : The layer cannot be edited.

- **Lock status**

The layer cannot be edited when it is locked. Double-click the lock icon in the **Layer Window**. The layer will toggle between locked and not locked.

- ☐ : The layer is locked. It cannot be edited.
- ☐ : The layer is not locked. It can be edited.

- **Layer name**

Double-click the layer name column in the **Layer Window** to rename it.

**Note:** The name must be a combination “a-zA-Z_”. However, first character must not use “0-9_”. Max number of characters is 30.

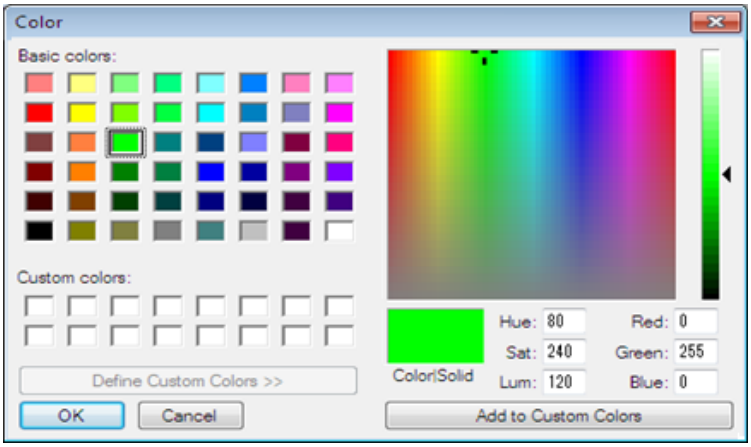
- **Z-order**

This displays the Z-order of the layer. You can change it by dragging and dropping the layer.

- **Color**

Double-click the **Color** area to select the preview color for the layer, as shown in Figure 5-16.

Figure 5-16. Color




**Note:** The preview color is used to display layers only in GAT-D; it does not exist in the generated code.

- **Right-click menu**

  Copy: This UI is disabled.

  Paste: This UI is disabled.

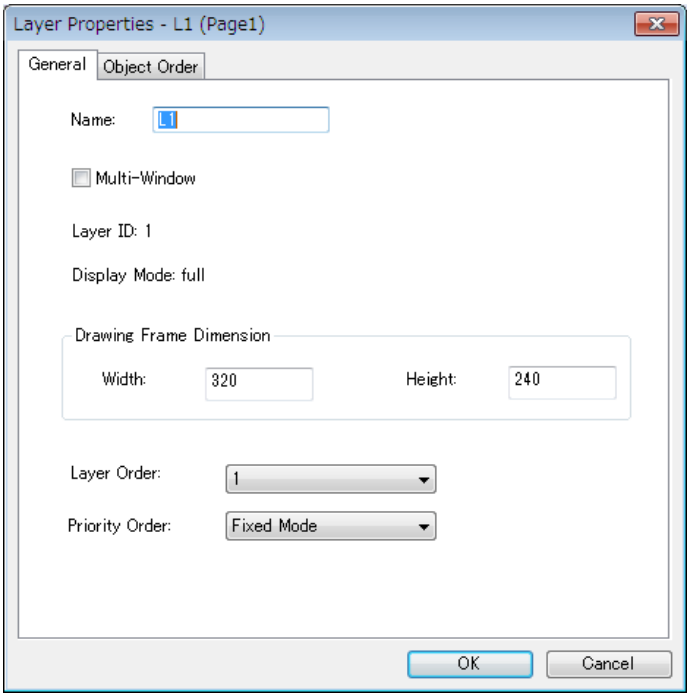
  Property: Display the Layer Properties dialog. See the next section.

### *5.4.2.1 Layer Properties*

When you double-click a selected layer in the working area or select **Properties…**” from the context menu in the Layer Window, the Layer Properties dialog is displayed.

Layer Properties has two tabs: General and Object Order.

Figure 5-17. General Tab




- **Name**

The name of the layer is alterable.

- **Multi-Window**

When you select this option, the window is displayed in multi-window mode.

Multi-window mode enables you to allocate up to eight windows per the layer.

Non-multi-window mode enables you to allocate only one window to the layer.

**Note:** Only one of the two layers can be set as a multi-window layer.

- **Drawing Frame Dimension**

This is the display size of the drawing frame. The information is read-only.

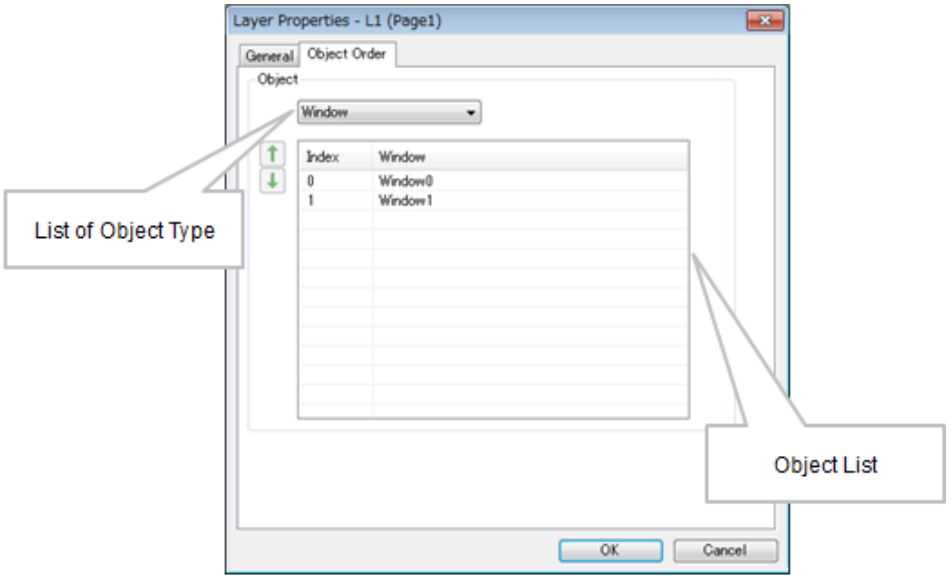
- **Layer Order**

This shows the layer order.

- **Priority Order**

This parameter is fixed.

Figure 5-18. Object Order Tab




- **List of object type**

This is a list of the types of object. Note that it is fixed to the Window type at the Layer Properties dialog.

- **Object list**

This is a list of the objects in the current layer that match the selected object type.

A larger index value appears at the top of the working area.

## 5.4.3 Window

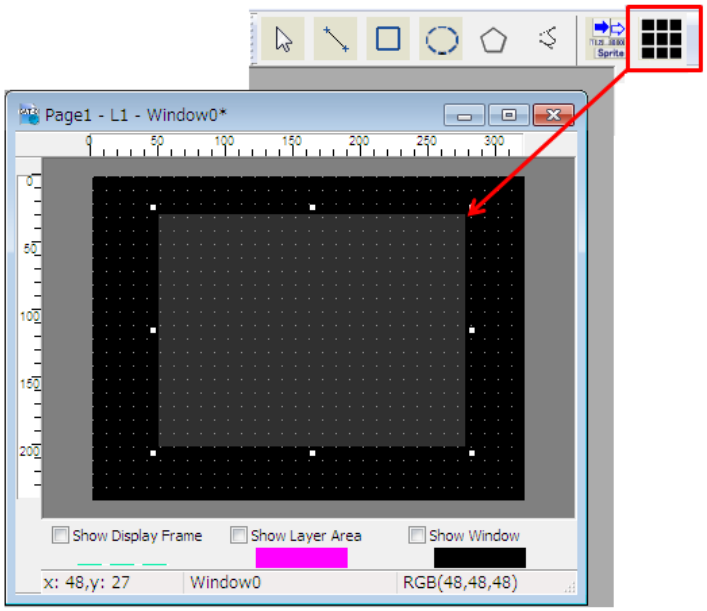
Before you add the object, the window must be added to the layer. The window is handled as follows:

### *5.4.3.1 Basic Operations*

- **Add**

Select the window icon from the draw bar. Then click on the working area. A window with the default size (100 x 100) is added. You can resize the window by controlling the fill handle or setting the property of the Window.

Figure 5-19. Add Window




- **Lock**

Locks the state of both the window and the object that belongs to the locked window. Select the window. Then either right-click or select **Lock** in the context menu or choose **Design** > **Lock** in the menu bar. See Context Menu.

- **Unlock**

Unlocks the window that is in the locked state. Note that the object that belongs to the unlocked window is not unlocked. Select the locked window. Then either right-click and select **Unlock** in the context menu or choose **Design** > **Unlock** in the menu bar. See Context Menu.

- **Copy**

Copies the window. When you copy a window, the object that belongs to it is copied too. Select the window. Then either right-click and select **Copy** in the context menu or choose **Edit** > **Copy** in the menu bar. See Context Menu.

- **Cut**

Cuts the window. When you cut a window, the object that belongs to it is cut too. Select the window. Then either right-click and select **Cut** in the context menu or choose **Edit** > **Cut** in the menu bar. See Context Menu.

- **Paste**

Pastes the object that has been cut or copied by either right-clicking and selecting **Paste** in the context menu or choosing **Edit** > **Paste** in the menu bar in the targeted layer. See Context Menu.

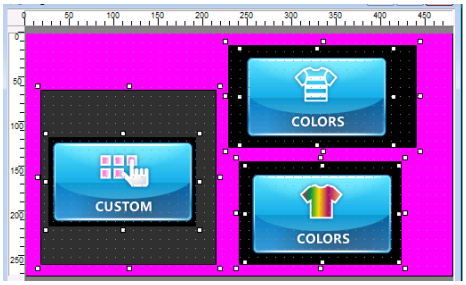
- **Delete**

Deletes the window. When you delete a window, the object that belongs to it is deleted too. Select the window. Then either right-click and select **Delete** in the context menu or choose **Edit** > **Delete** in the menu bar. See Context Menu.

- **Select All**

Selects all windows and objects on the current layer. When you perform this operation, all objects are selected on the targeted layer as shown Figure 5-20. Choose **Edit** > **Select All** in the menu bar.

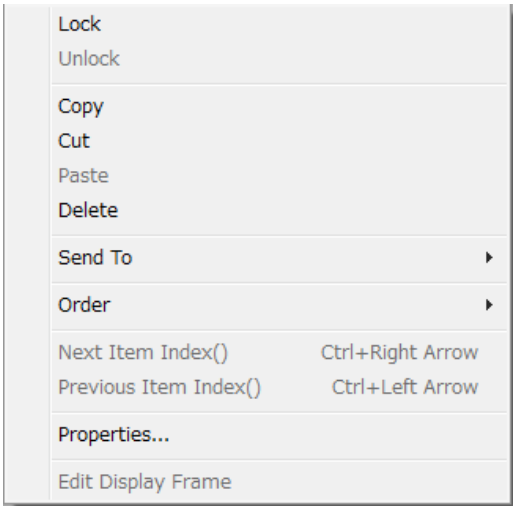
Figure 5-20. Sample of Select All




### *5.4.3.2 Context Menu*

The context menu of **Window** is shown in Figure 5-21.

Figure 5-21. Context Menu




- **Lock/Unlock**

Locks/unlocks the selected window. If a window is locked, it cannot be edited, moved, and so on.

- **Copy/Cut/Paste**

Copies/cuts/pastes the selected window. This supports operations between layers, pages, and projects.

- **Delete**

Deletes the selected window.

- **Send To**

This UI is disabled.

- **Order**

Changes the order of the windows in the current layer.

Figure 5-22. Set Order of Window



- **Next/Previous Item Index()**

This UI is disabled.

- **Properties…**

Displays the dialog box for the properties of the selected window. This dialog box also can be opened by double-clicking the selected window.

- **Edit Display Frame**

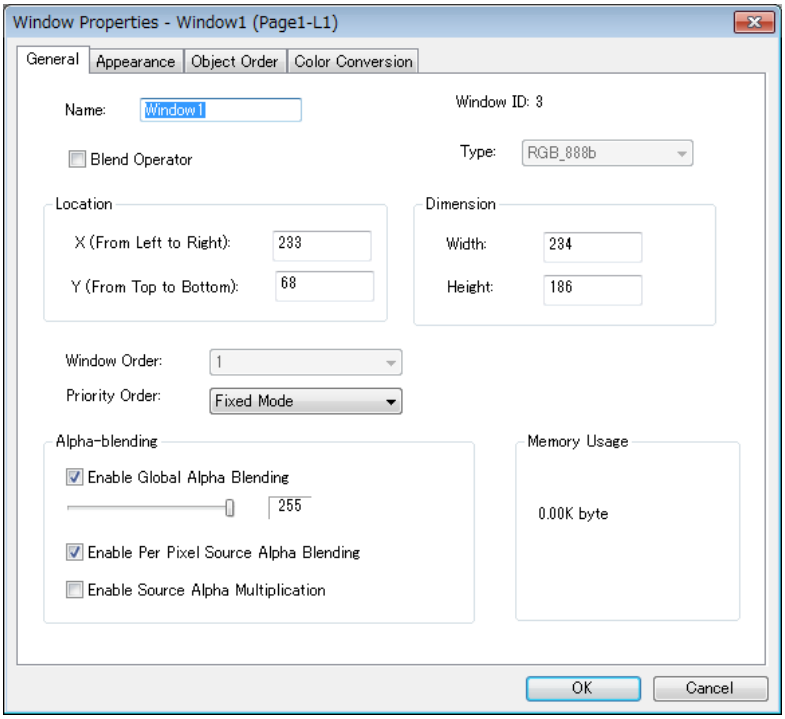
This UI is disabled.

### *5.4.3.3 Window Properties*

The **Window Properties** dialog has four tabs: General, Appearance, Object Order, and Color Conversion.

#### General

Figure 5-23. General Tab




- **Name**

The name of the window is alterable.

- **Window ID**

The ID of the window.

- **Blend Operator**

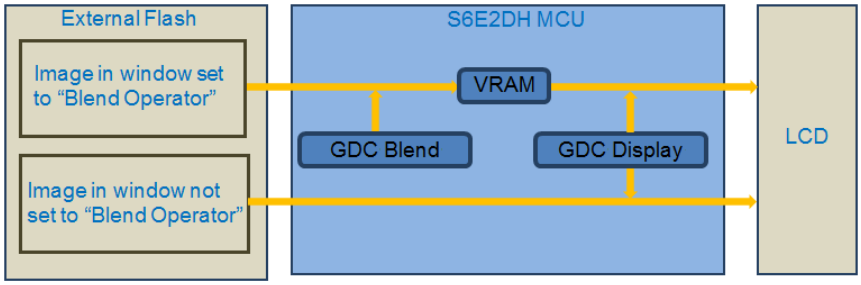
Select this option when blending the window. When adding several objects to one window, this option must be selected.

If this option is selected, the objects on the window are blended with one another. There is no limit to the number of objects for the blend operation. GAT-D uses VRAM memory for display.

If this option is not selected, the window enables you to have only one sprite object, which does not include vector graphics. (See Object for details). GAT-D does not use VRAM memory for display.

Figure 5-24 shows the difference between images in windows that are set and not set to Blend Operator.

Figure 5-24. Blend Operator




- **Type**

Selects the color format type of the window. The color format can be RGB_888a, RGB_565, RGB_555a, or RGB_444a. The color depth of RGB_888a is 4 bytes, and the others formats are 2 bytes. Thus, when using RGB_888a, the VRAM memory embedded in the device will use double size for **Blend Operator**.

When you disable Blend Operator, Type is also disabled.

- **Location**

Displays the location of the window

- **Dimension**

Displays the size of the window

- **Window Order**

Displays the index for the order of the window. Its number is read-only.

If windows overlap on the same layer, only the window with the higher order index in the overlapped part will be drawn.

- **Priority Order**

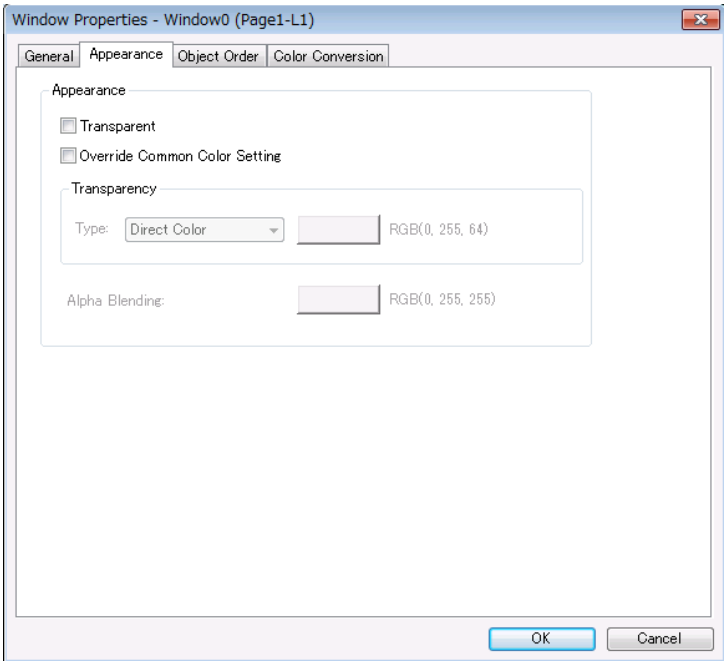
This is fixed for the Fixed Mode.

- **Alpha-blending**

These settings affect blending with objects, windows, and the background layer. See Alpha Blend for details.

### Appearance

Figure 5-25. Appearance Tab



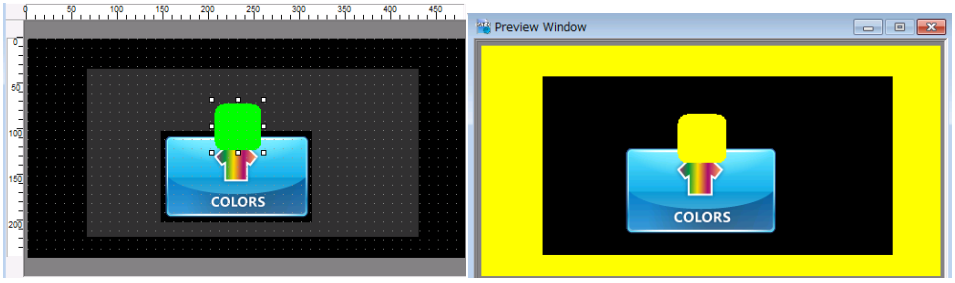

When **Override Common Color Setting** is selected, the color setting of the window can be set individually. This means that the color setting of the project is ignored on the current window.

### Transparency

This sets the disabled color on the window. When it is set, the set color parts on the window are displayed by the background color of the layer. This function is enabled when you select the **Transparent** option.

An example of enabling this function is shown in Figure 5-26, where the background of the layer is yellow and the transparency is green.

Figure 5-26. Example of Transparency

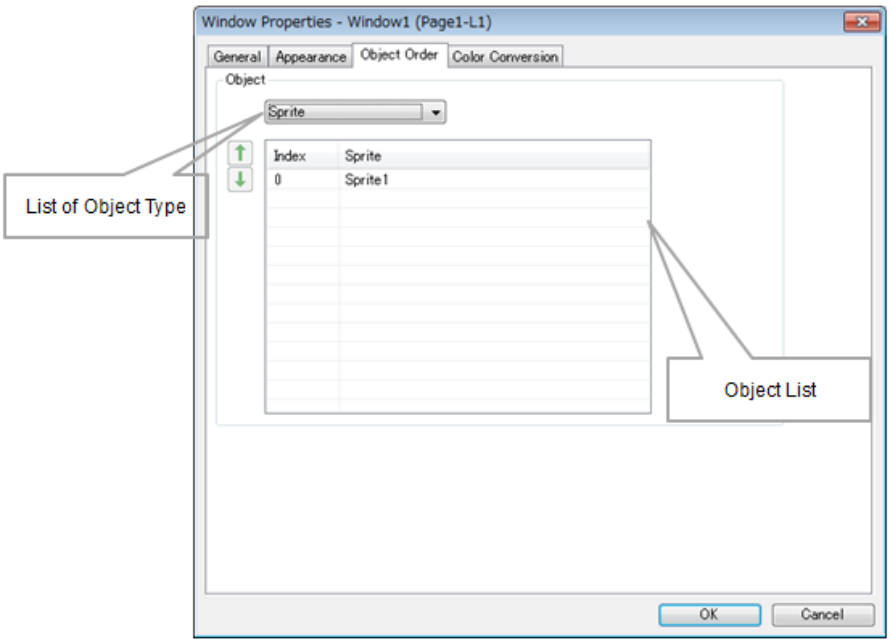



### Alpha Blending

This sets the alpha blending color in the window. It is used when enabling **Alpha-blend** and setting **Blend Value Select** to **Blend Value** or **Blend Value Multiplication,** and setting **Blend Color Select** to **Alpha Blending** in the properties of the sprite object.

- **Object** Order

Figure 5-27. Object Order Tab




- **List of Object Type**

Lists the type of the object

- **Object List**

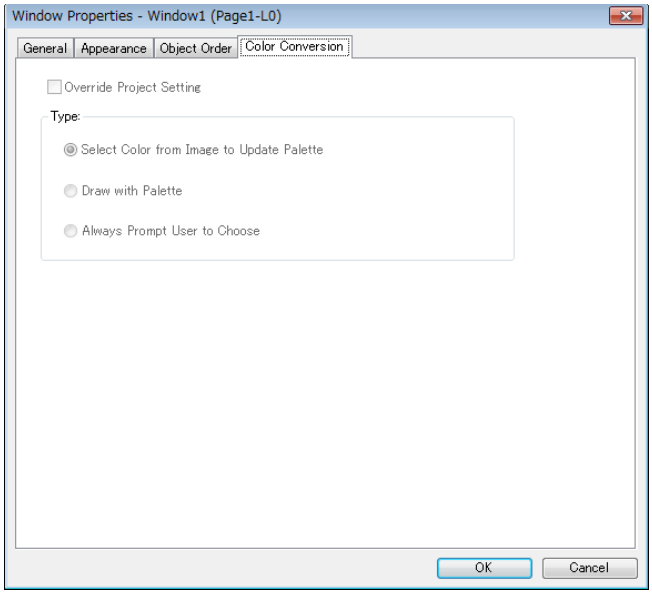
Lists all the objects on the current window

The larger index value appears on the topside of the window.

- **Color** Conversion

This UI is disabled.

Figure 5-28. Color Conversion Tab



## 5.4.4 Object

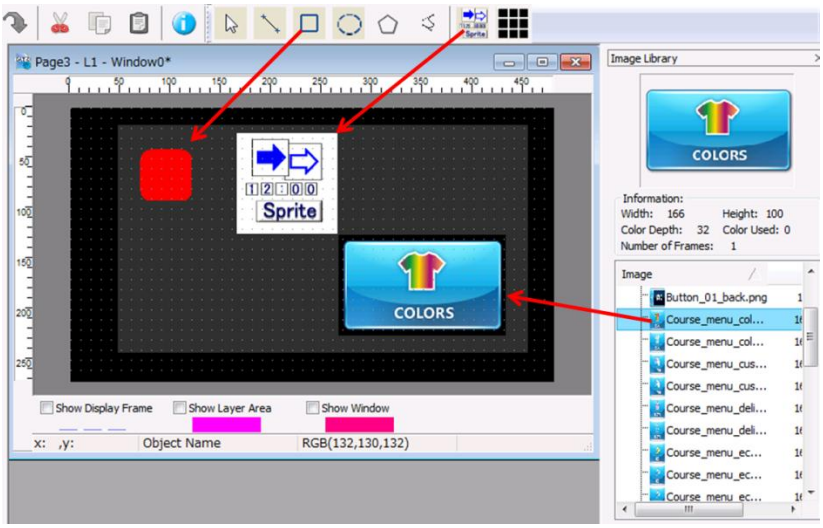
An object has two types: vector graphics and sprite.

### *5.4.4.1 Basic Operations*

- **Add**

Select the sample object from the draw bar, and click in the working area. The sprite object also enables you to add an image from the **Image Library** via the pull-down menu. (See Figure 5-29)

Figure 5-29. Add Object to Window




- **Lock:**

Locks the state of an object. Select the object. Then either select **Lock** in the context menu or choose **Design** > **Lock** in the menu bar.

- **Unlock:**

Unlocks an object in a lock state. Select the locked object. Then click either select **Unlock** in the context menu or choose **Design** > **Unlock** in the menu bar.

- **Copy:**

Copies the object. Select the object. Then either select **Copy** in the context menu or choose **Edit** > **Copy** in the menu bar.

- **Cut:**

Cuts the object. Select the object. Then either select **Cut** in the context menu or choose **Edit** > **Cut** in the menu bar.

- **Paste:**

Pastes an object that has been cut or copied. Either select **Paste** in the context menu or choose **Edit** > **Paste** in the menu bar on the targeted window.

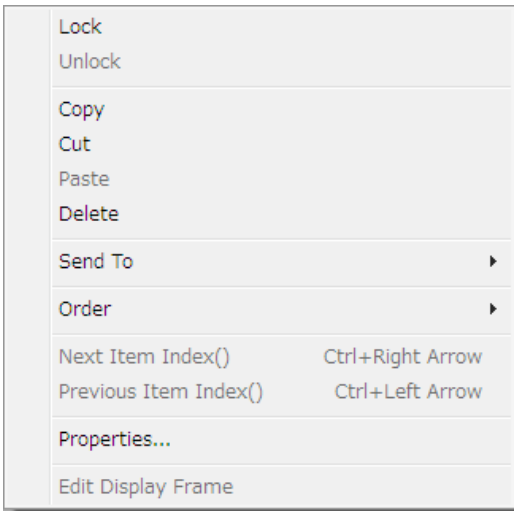
- **Delete:**

Deletes the object. Select the object. Then either select **Delete** in the context menu or choose **Edit** > **Delete** in the menu bar.

### 5.4.4.2 Context Menu

The context (right-click) menu for **Object** is shown in Figure 5-30.

Figure 5-30. Context Menu for Object




- **Lock/Unlock**

Locks/unlocks the selected object. If the object is locked, it cannot be edited, moved, and so on.

- **Copy/Cut/Paste**

Copies/cuts/pastes the selected object. This supports operations between layers, pages, and projects.

- **Delete**

Deletes the selected object.

- **Send To**

Sends the selected object to another window.

- **Order**

Change the order of the selected object on the current window as shown Figure 5-31.

Figure 5-31. Set the Order of an Object




- **Next/Previous Item Index()**

This UI is disabled.

- **Properties…**

Display the **Properties…** dialog box of the selected object. It also can be opened by double-clicking on the object.

- **Edit Display Frame**

This UI is disabled.

### 5.4.4.3 Sprite Object

The sprite object has two types: basic sprite and special sprite. See Figure 5-32 and Figure 5-33 for adding a basic sprite.

**Note:** If the image file is larger than 2048 x 2048 pixels, it cannot be converted into sprite object. After resizing it by the external editor tool, convert it.

Figure 5-32. Basic Sprite from Draw Bar

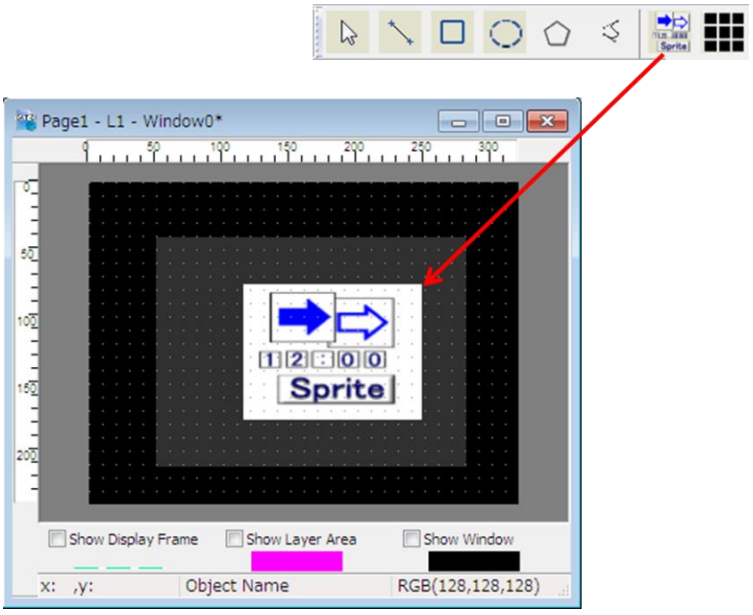
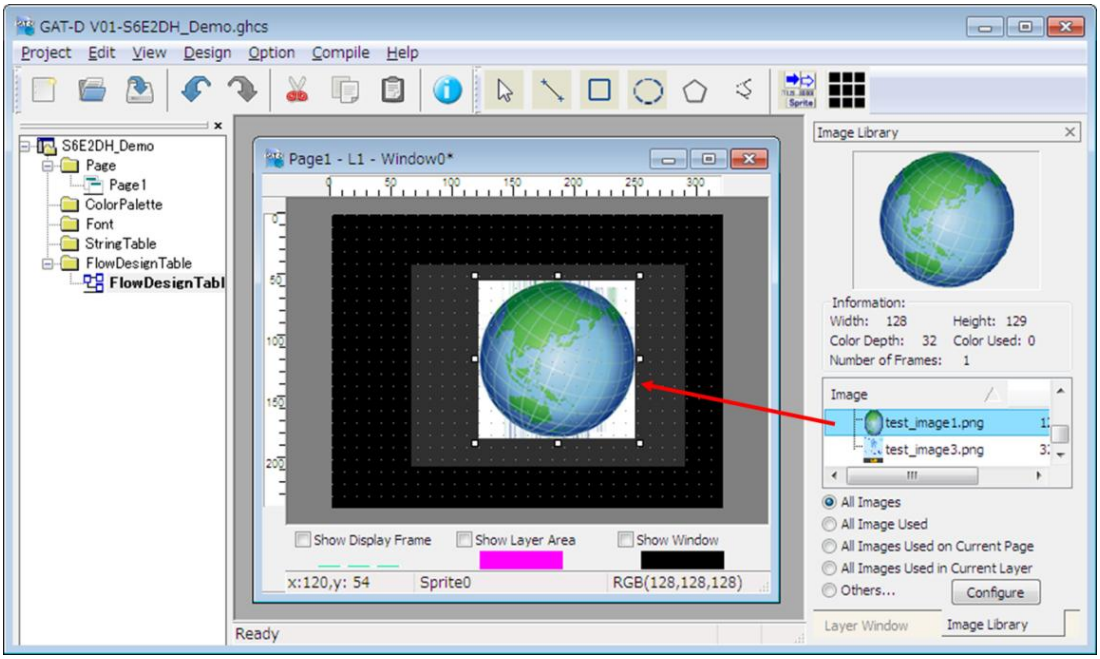



Figure 5-33. Basic Sprite from Image Data

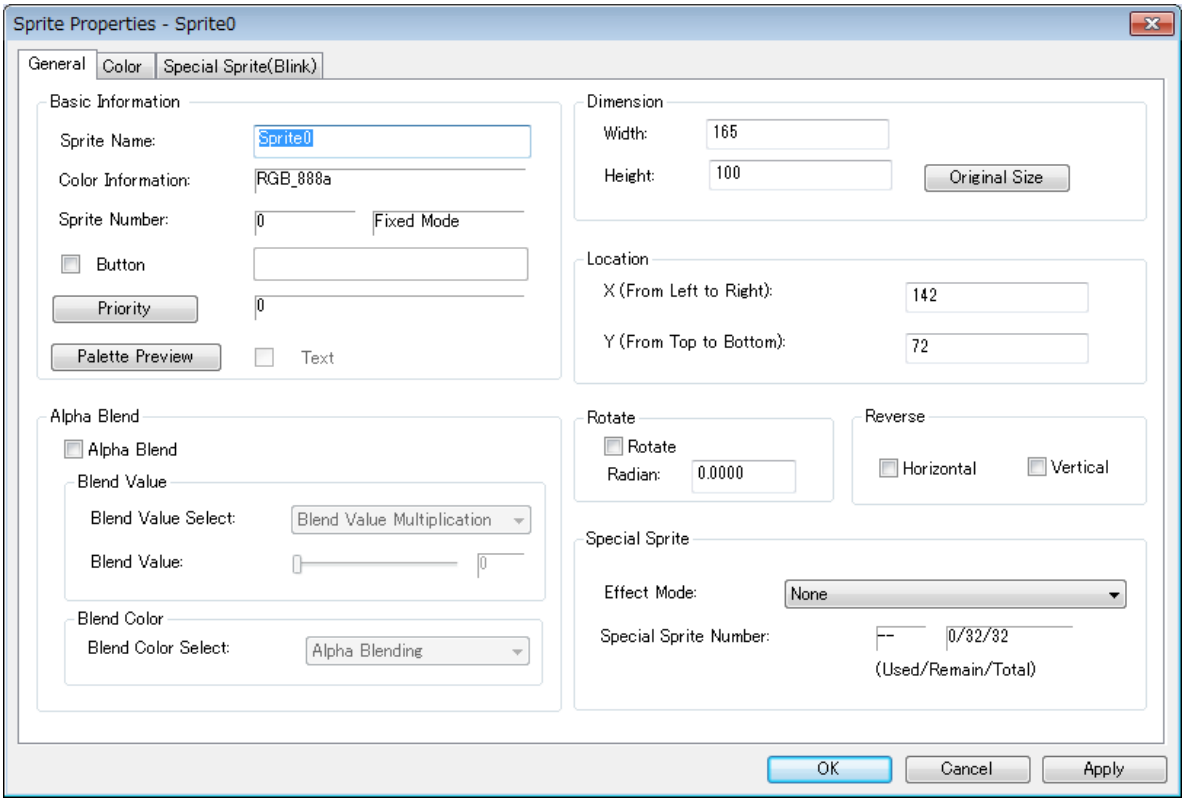


### 5.4.4.3.1 Properties of Sprite Object

The Sprite Properties dialog has three tabs: General, Color, and Special Sprite (Blink).

#### General Tab

Figure 5-34. Sprite Properties, General Tab




- **Sprite Name**

Displays and changes the name of the sprite object.

- **Color Information**

Displays the color format of the sprite object.

- **Sprite Number**

Displays the unique number of the sprite object.

- **Button**

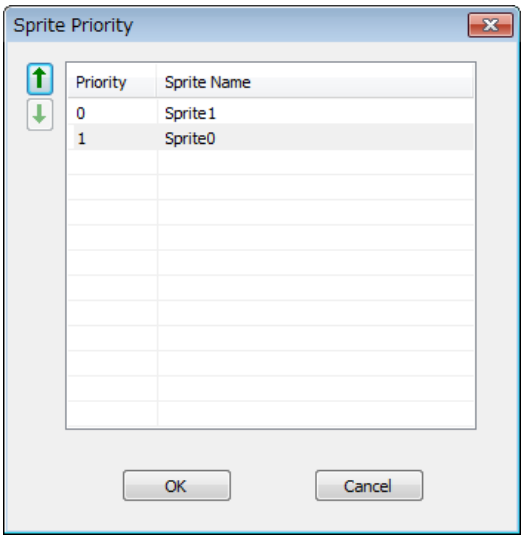
This Button is a parameter to use the displayed sprite object on the touch panel as UI. Its name is used as the ID in source code. It enables checkbox in order to edit the Button name. Refer to *GETTING STARTED FOR FM4 S6E2DH (GAT-D).pdf.*

### Priority

Changes the order of the selected sprite objects on the current window.

When you click the **Priority** button, the **Sprite Priority** dialog box is displayed. See Figure 5-35.

Figure 5-35. Sprite Priority






Move the selected sprite object up/down by one line.

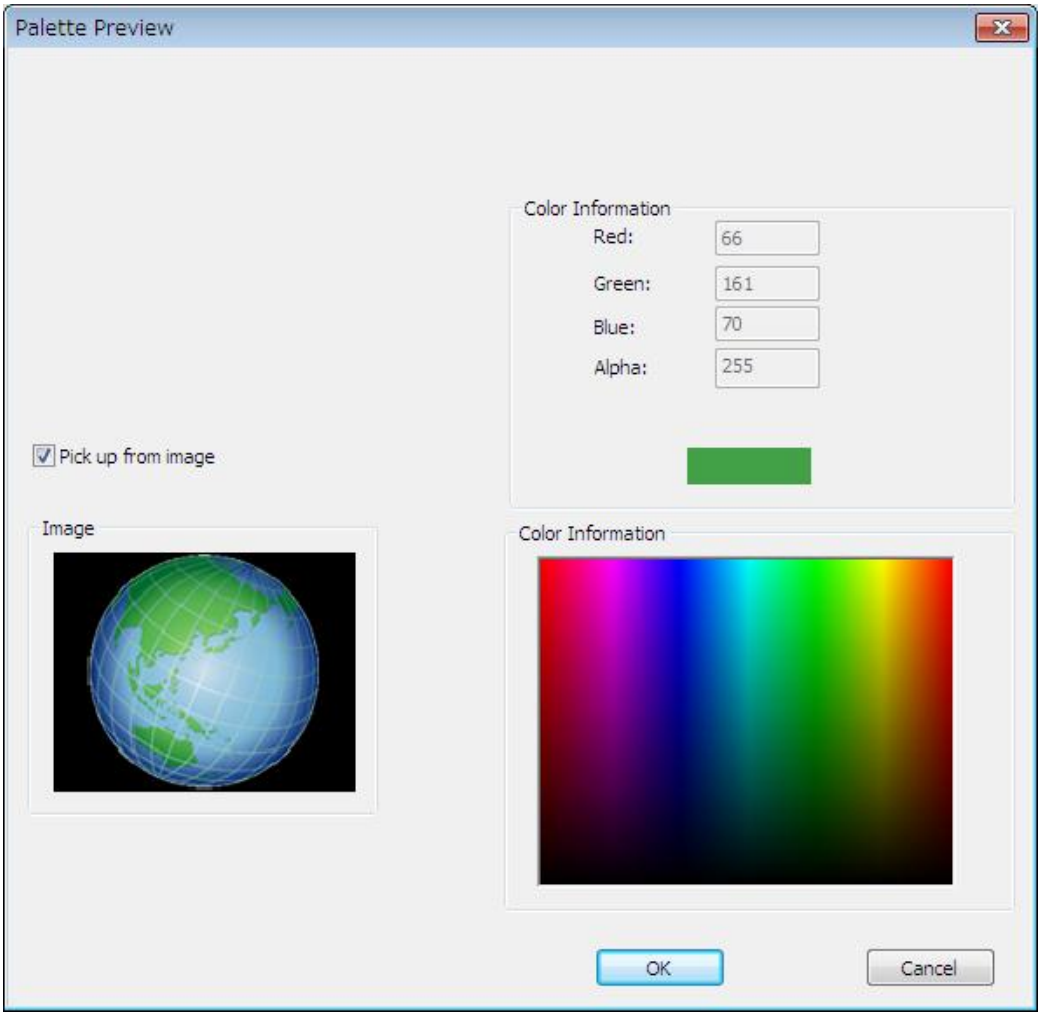
The arrangement result is reflected in the working area.

**Note:** A sprite object with a large value in the **Priority** column has a high priority. A high-priority object is displayed in front of a low-priority object.

### Palette Preview

When you click the **Palette Preview** button, the **Palette Preview** dialog will be displayed. This dialog enables you to watch the RGB value on an image when you select the **Pick up from image** option and click on the image.

Figure 5-36. Pick Up from Image




- **Text**

This UI is disabled.

- **Dimension**
  - **Width/Height**

    This displays the size of the sprite object. It enables you to resize the sprite object by changing the dimensions.
  - **Original Size**

    This button changes the **Width/Height** items to the original size of the sprite object.
- **Location**

This displays the location of the sprite object. Upper left is (0, 0).

- **Rotate**

This enables or disables the rotation of the sprite object. If enabled, you can set the radian of clockwise rotation.

The range is 0–6.2831 radian.

- **Reverse**

This enables you to reverse the sprite object in two ways: **Horizontal** and **Vertical**.

- **Special Sprite**
  - **Effect Mode**

    Set the effect on the sprite object. See Table 5-2.

Table 5-2. Effect Mode

| Selection Item | Settings |
|---|---|
| None | The object is displayed with no effect. |
| Blink | The object is drawn by special sprite (blink).<br>The advanced setting can be set in the Special Sprite (Blink) tab.* |

* The **Special Sprite (Blink)** tab can be opened only when you set **Effect Mode** to **Blink**.

  - **Special Sprite Number**

    Displays a unique number for the sprite object.

  - **Used/Remain/Total**

    Displays Number of used Special Sprite Object, Number of unused Special Sprite Object, and Number of Special Sprite Object information on the current window.

- **Alpha Blend**

When you select this option, the alpha blend function is enabled.

  - **Blend Value Select**

    Set the type of blend value. See Table 5-3.

Table 5-3. Blend Value Select

| Selection Item | Settings |
|---|---|
| Alpha Table | Use the alpha value of each pixel in the sprite object. |
| Blend Value | Use the set alpha value (global alpha blend value) against all pixels of the sprite object. |
| Blend Value Multiplication | Use the multiplied value that is the each pixel's alpha value and the global alpha blend value.<br>For example, if the alpha value of a pixel is 128:<br>Blend Value: 128<br>Blend Value Multiplication = (128/255 x 128/255) x255 |

  - **Blend Value**

    Set the alpha blend value.

  - **Blend Color Select**

    Set the RGB value to use in the alpha blend.

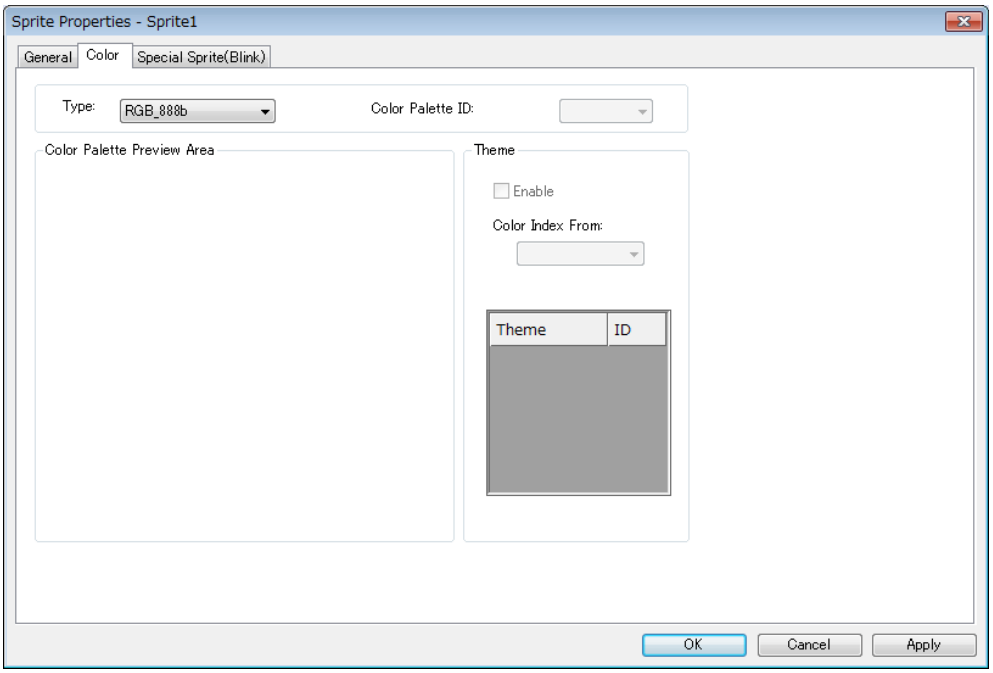
    The method of the alpha blend is set. See Table 5-4.

Table 5-4. Blend Color Select

| Selection Item | Settings |
|---|---|
| Alpha Blending | Use the window color. |
| Drawn Window | Use the pixel color of the sprite object. |

### Color Tab

Figure 5-37. Sprite Properties, Color Tab




- **Type**

Sets the color format type of an object. The format can be RGB_888a, RGB_565, RGB_555a, or RGB_444a.

- **Color Palette ID**

This UI is disabled.

- **Color Palette Preview Area**

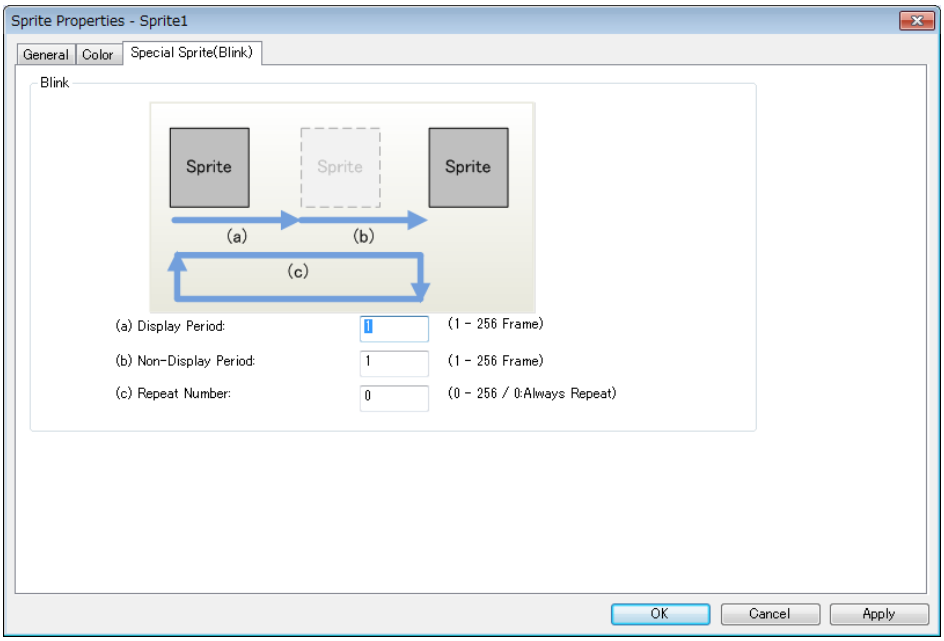
This UI is disabled.

- **Theme**

This UI is disabled.

### Special Sprite (Blink)

Figure 5-38. Special Sprite (Blink)




- **Display Period**

Sets the display period of the special sprite (blink).

- **Non-Display Period**

Sets the non-display period of the special sprite (blink).

- **Repeat Number**

Sets the number of blinks.

If the repeat number is "0", it always blinks.

### 5.4.4.4 Vector Graphics Object

The vector graphics object is used to show the image data as primitive. There are three types: line, rectangle, and circle.

To create a vector graphics object, click the vector graphics buttons on the draw bar and then draw the object in the working area, as shown in Figure 5-39, where ①is the line object drawing button, ② is the object start point, ③ is the object end point, ④is the rectangle object drawing button, and ⑤is the circle object drawing button. See Figure 5-40, Figure 5-41, and Figure 5-42.

**Note:** If you use a vector graphics object, you must select Blend Operator in the Properties of Window. See Window for details on Blend Operator.

Figure 5-39. Draw Shape

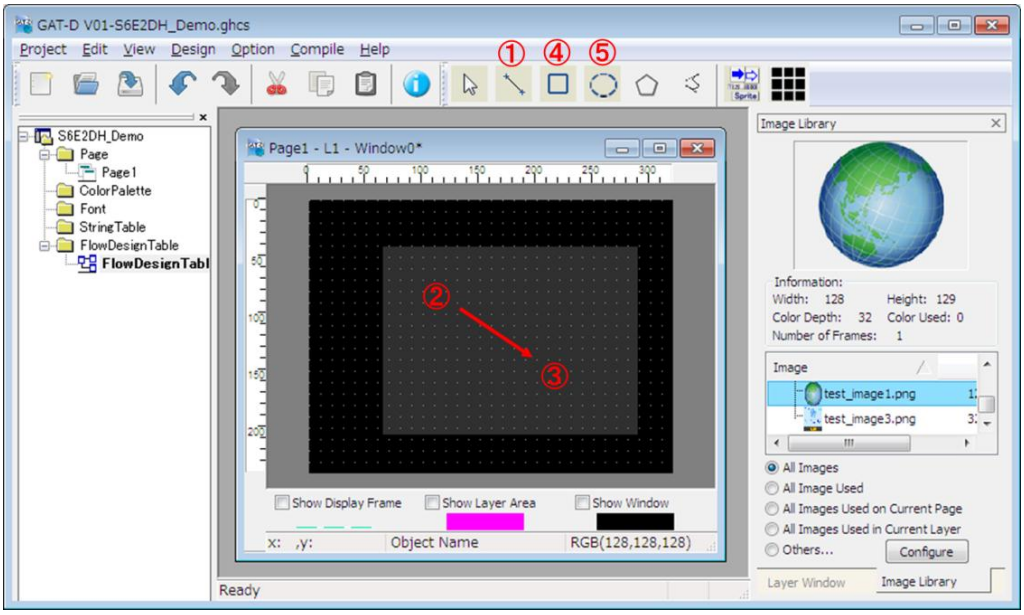



Figure 5-40. Draw Line

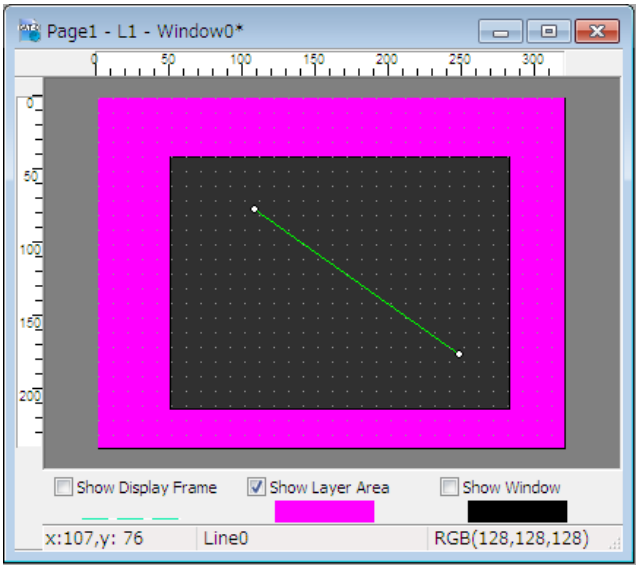


Figure 5-41. Draw Rectangle

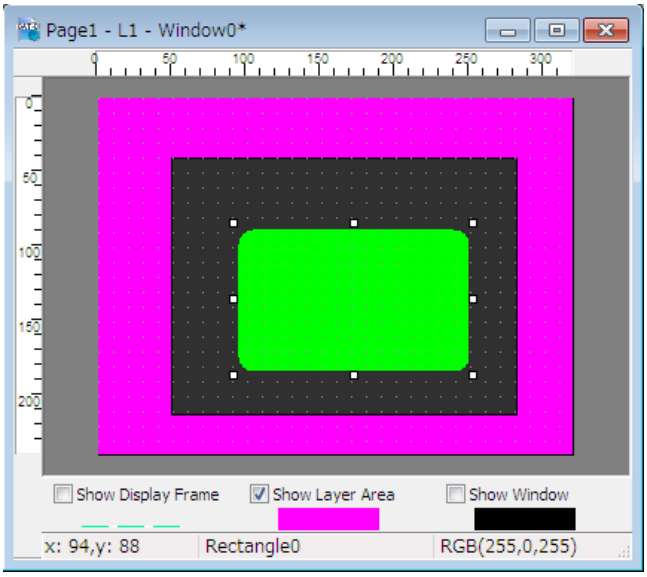
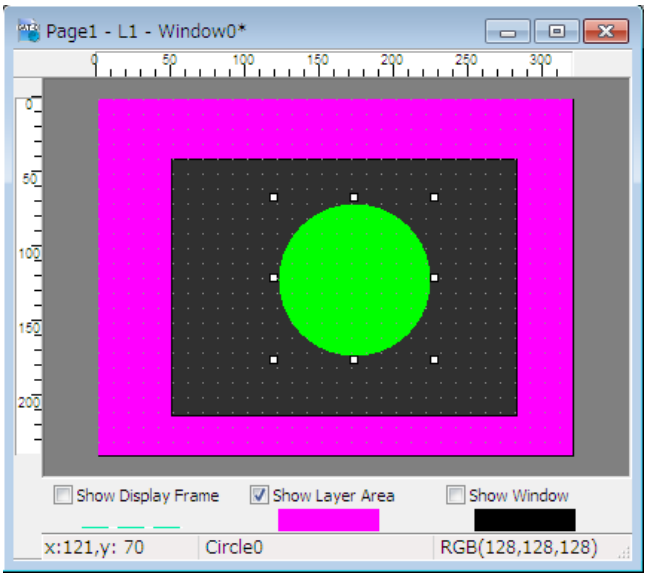



Figure 5-42. Draw Circle

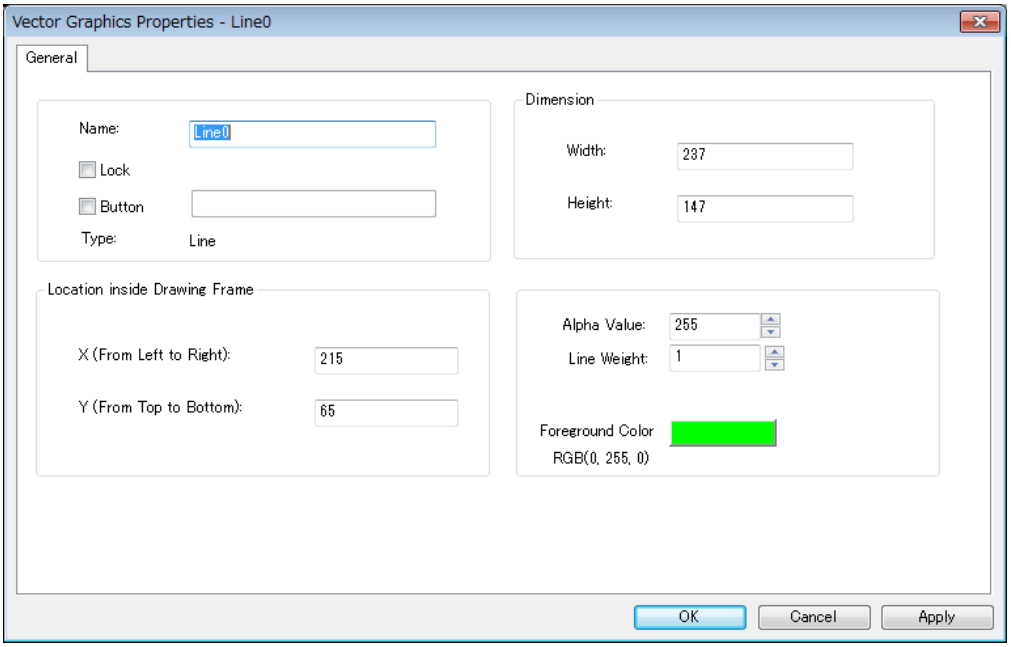


#### 5.4.4.4.1 Properties of Vector Graphics Object

The Vector Graphics Properties dialog has only one tab: General. Parameters of properties are different for vector graphics.

### General (Line)

Figure 5-43. General (Line) Tab




- **Name**

Displays and changes the name of the vector graphics object

- **Lock**

Locks the vector graphics object to protect the object from change

- **Button**

Selects whether you use the object area as a button interface for the touch panel. With the name input, the button area can be accessed by an API on the embedded side.

- **Type**

Displays the type of the vector graphics object

- **Dimension**

Displays and changes the size of the vector graphics object

- **Location inside Drawing Frame**

Displays and changes the location of the vector graphics object

- **Alpha Value**

Displays and changes the alpha value of the vector graphics object

- **Line Weight**

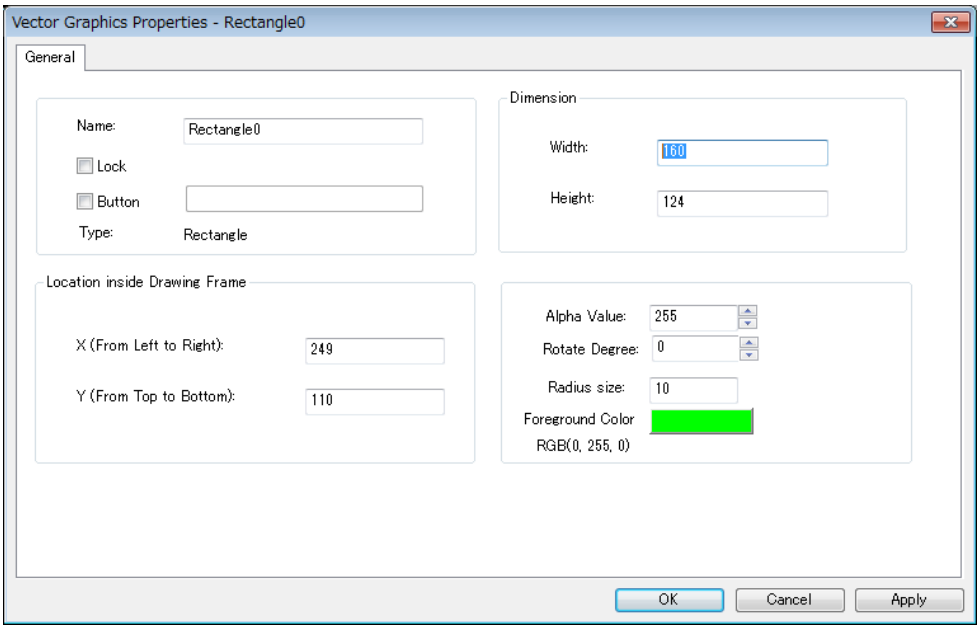
Displays and changes the point size of the line weight

- **Foreground Color**

Displays and changes the filling color of the vector graphics object

## General (Rectangle)

Figure 5-44. General (Rectangle) Tab




- **Name**

Displays and changes the name of the vector graphics object

- **Lock**

Locks the vector graphics object to protect the object from change

- **Button**

Selects whether you use the object area as a button interface for the touch panel. With the name input, the button area can be accessed by an API on the embedded side.

- **Type**

Displays the type of the vector graphics object

- **Dimension**

Displays and changes the size of the vector graphics object

- **Location inside Drawing Frame**

Displays and changes the location of the vector graphics object

- **Alpha Value**

Displays and changes the alpha value of the vector graphics object

- **Rotate Degree**

Displays and changes the rotate degree of the vector graphics object

- **Radius Size**

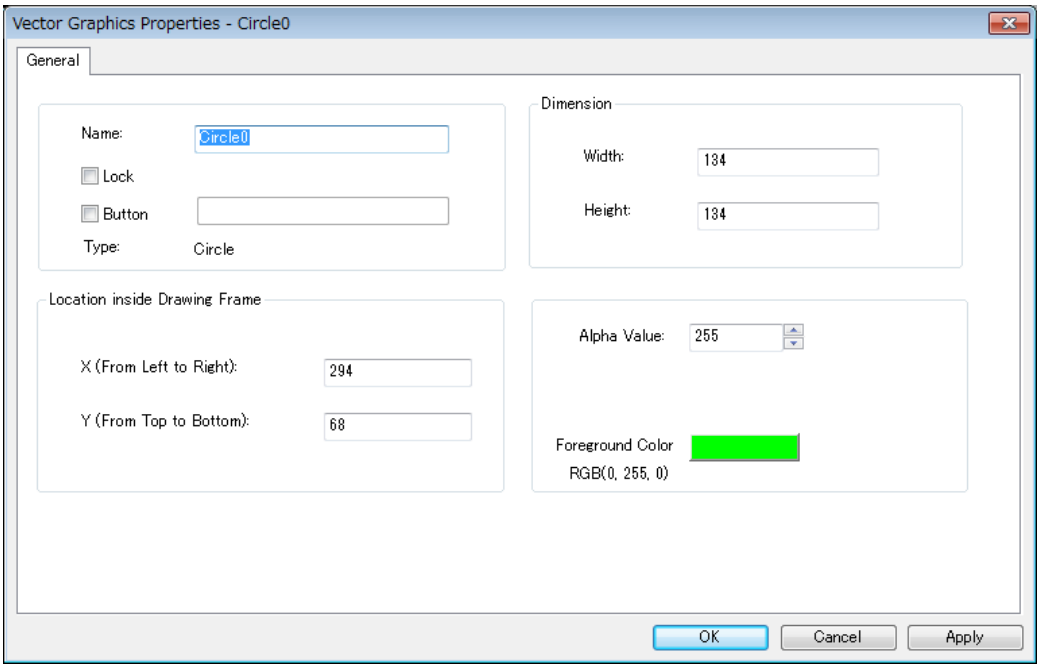
Displays and changes the radius size of the corner of the vector graphics object

- **Foreground Color**

Displays and changes the fill color of the vector graphics object

## General (Circle)

Figure 5-45. General (Circle) Tab




- **Name**

Displays and changes the name of the vector graphics object

- **Lock**

Locks the vector graphics object to protect the object from change.

- **Button**

Selects whether you use the object area as a button interface for the touch panel. With the name input, the button area can be accessed by an API on the embedded side.

- **Type**

Displays the type of the vector graphics object

- **Dimension**

Displays and changes the size of the vector graphics object

- **Location inside Drawing Frame**

Displays and changes the location of the vector graphics object

- **Alpha Value**

Displays and changes the alpha value of the vector graphics object

- **Foreground Color**

Displays and changes the fill color of the vector graphics object

## 5.4.5 Alpha Blend

### *5.4.5.1 Alpha Blend of Sprite Object*

Figure 5-46 shows the effect of alpha blend setting.

Figure 5-46. Alpha Blend Illustrations

Used image for operating the alpha blend

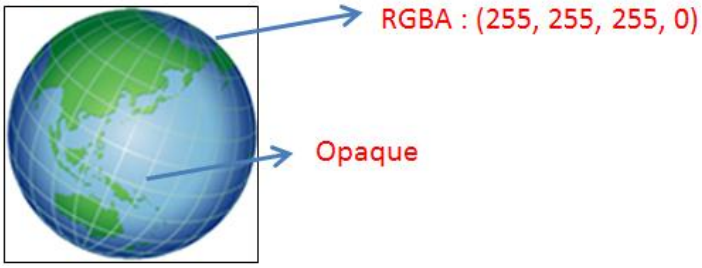



Illustration A: Result of disabling **Alpha Blend**

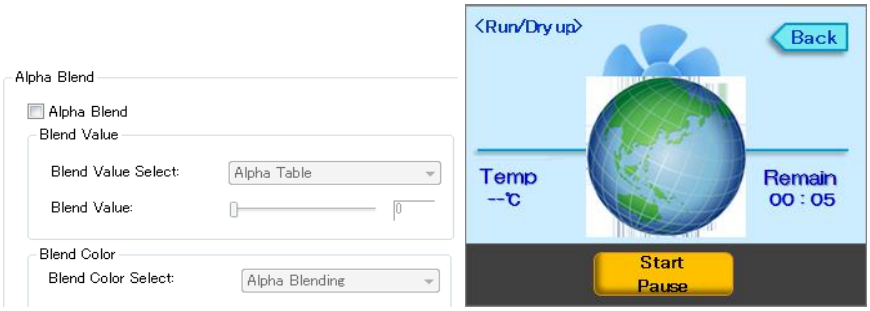



Illustration B: Result of enabling **Alpha Blend** with **Alpha Table**

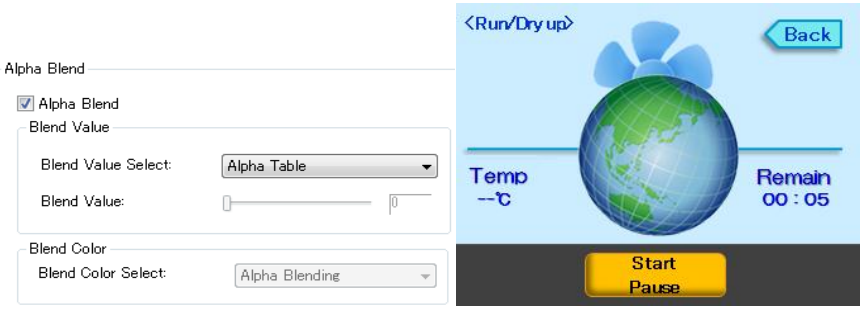


Illustration C: Result of enabling **Alpha Blend** with **Blend Value** (= 0) and **Drawn Window** mode

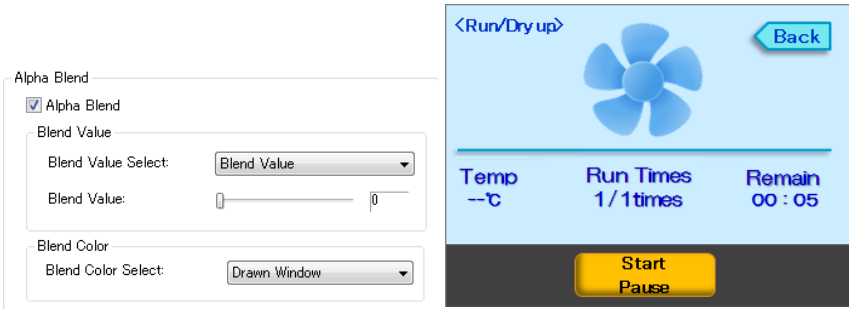



Illustration D: Result of enabling **Alpha Blend** with **Blend Value** (= 128) and **Drawn Window** mode

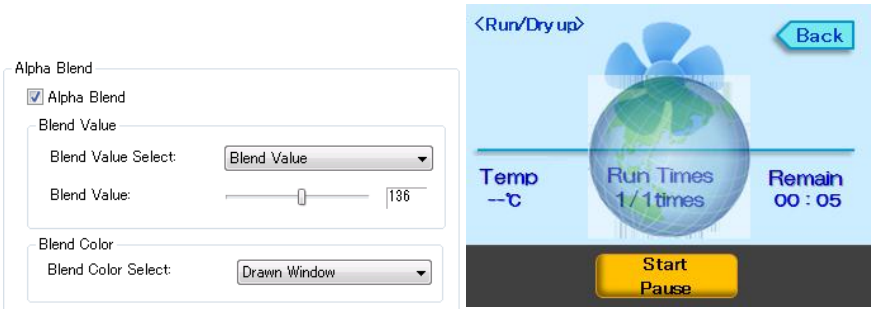



Illustration E: Result of enabling **Alpha Blend** with **Blend Value** (= 255) and **Drawn Window** mode

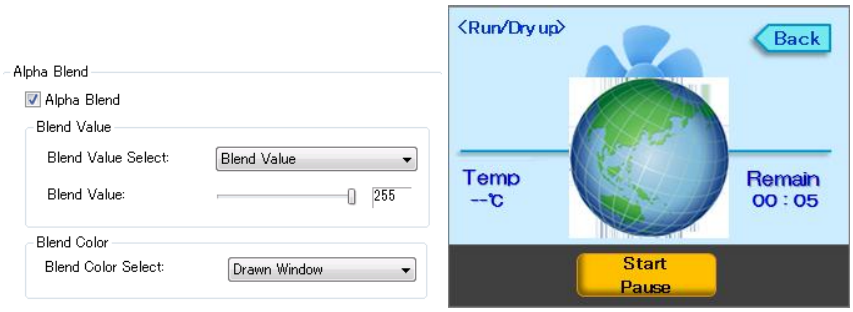



Illustration F: Result of enabling **Alpha Blend** with **Blend Value** (= 0) and **Alpha Blending** mode

**Note:** Alpha Blending mode is influenced by the alpha blending color of the window. See Common Color Setting and Window Properties.

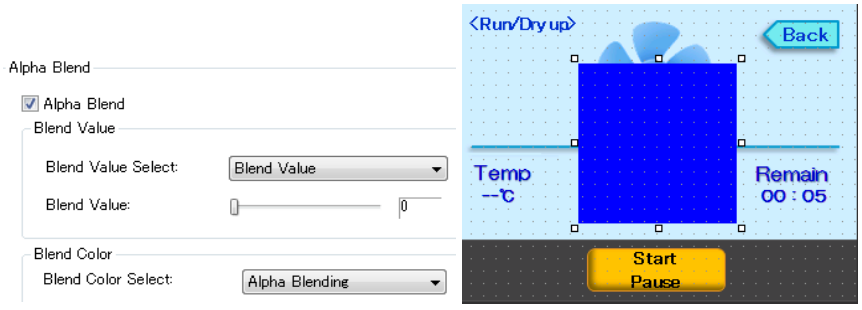


Illustration G: Result of enabling **Alpha Blend** with **Blend Value** (= 136) and **Alpha Blending** mode

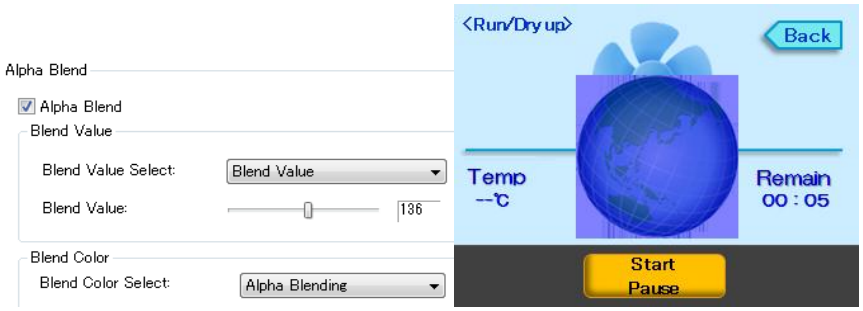



Illustration H: Result of enabling **Alpha Blend** with **Blend Value** (= 255) and **Alpha Blending** mode

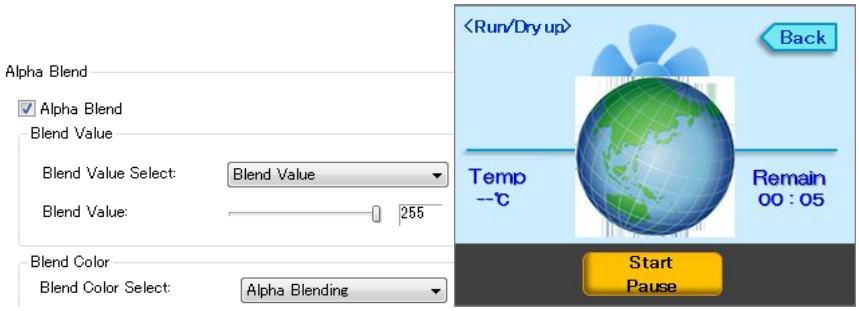



Illustration I: Result of enabling **Alpha Blend** with **Blend Value Multiplication** (= 0) and **Drawn Window** mode

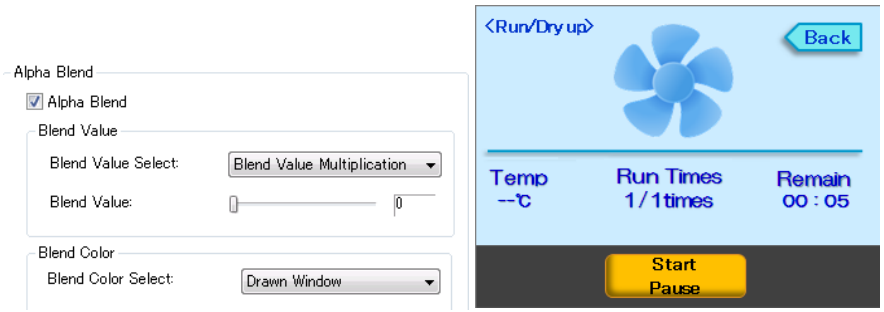



Illustration J: Result of enabling **Alpha Blend** with **Blend Value Multiplication** (= 136) and **Drawn Window** mode

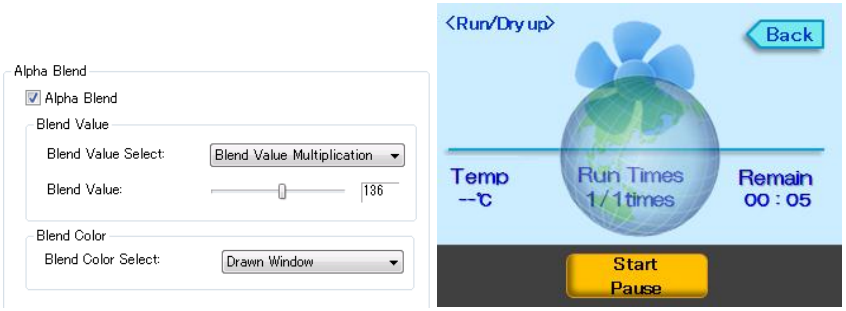


Illustration K: Result of enabling **Alpha Blend** with **Blend Value Multiplication** (= 255) and **Drawn Window** mode

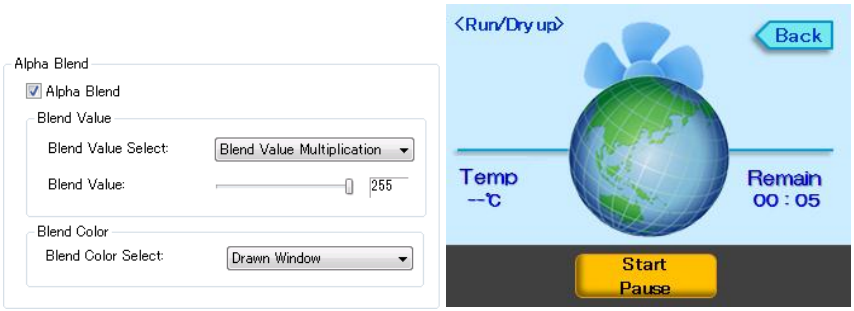



Illustration L: Result of enabling **Alpha Blend** with **Blend Value Multiplication** (= 0) and **Alpha Blending** mode

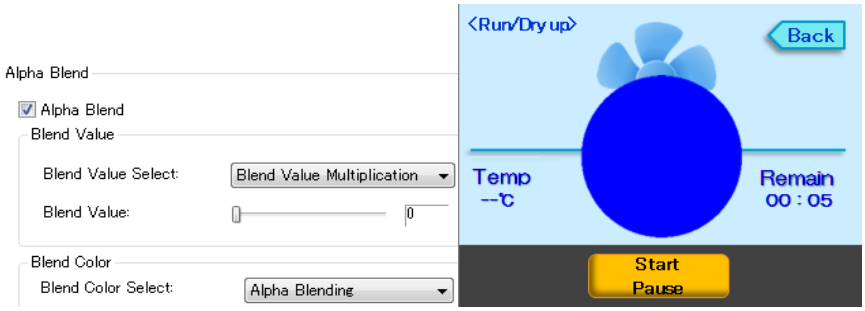



Illustration M: Result of enabling **Alpha Blend** with **Blend Value Multiplication** (=126) and **Alpha Blending** mode

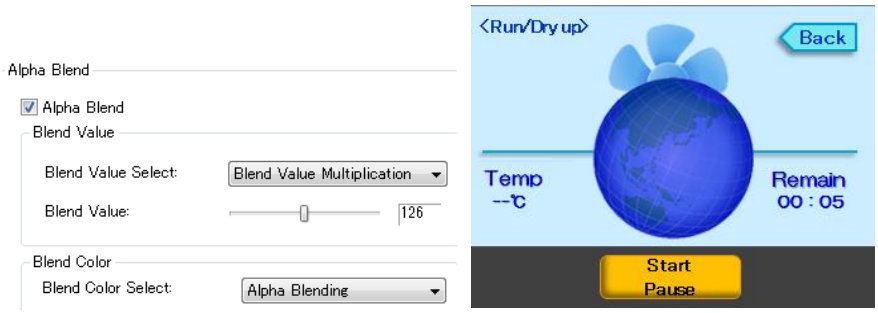
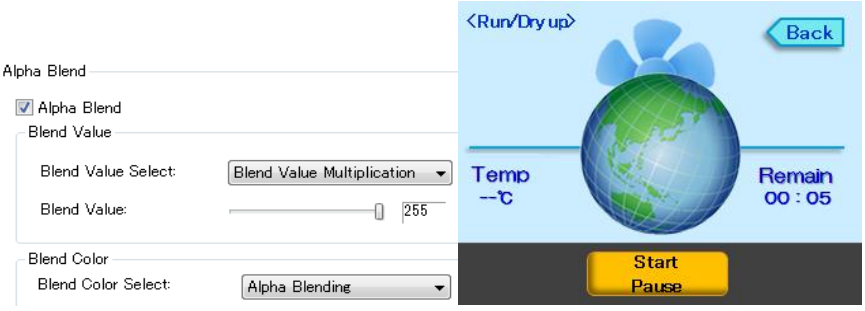



Illustration N: Result of enabling **Alpha Blend** with **Blend Value Multiplication** (= 255) and **Alpha Blending** mode



### 5.4.5.2 Alpha Blending of Window

The effect of alpha blending setting of window (global alpha blending, per-pixel source alpha blending, and source alpha multiplication) can be described according to the following formula:

```
int As = 1;
if ( Global Alpha Blending == True )
As = As * Global Alpha;
int Ad = As;
if ( Per Pixel Source Alpha Blending == True )
Ad = Ad * Asrc;
if (Source Alpha Multiplication == True)
As = As * Asrc;

Cout = Csrc * As + Cdst * (1 - Ad);
```

Where: `Csrc` is the source color.

`Asrc` is the source alpha value divided by 255.

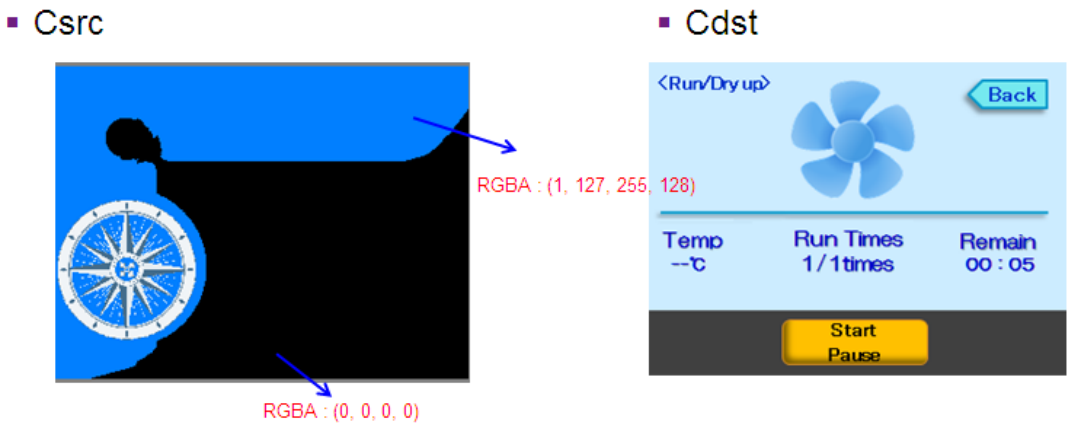
`Cdst` is the (blend) destination color.

`Cout` is the output color from the layer blend unit.

**Note:** The source is the current layer's window image, and the destination is the lower layer's window image (or background color).

Figure 5-47 shows a picture of Csrc, which is on the setting window, and Cdst, which is the blend background of the setting layer.

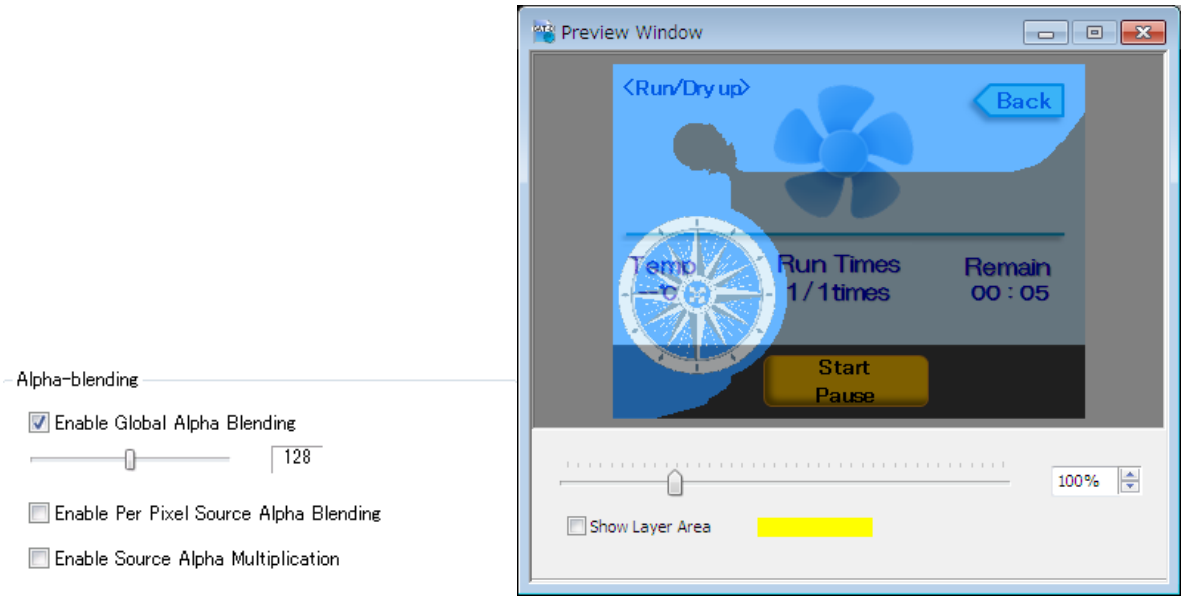
Figure 5-47. Csrc and Cdst




**Note:** The alpha blend setting of sprite object is set as alpha table.

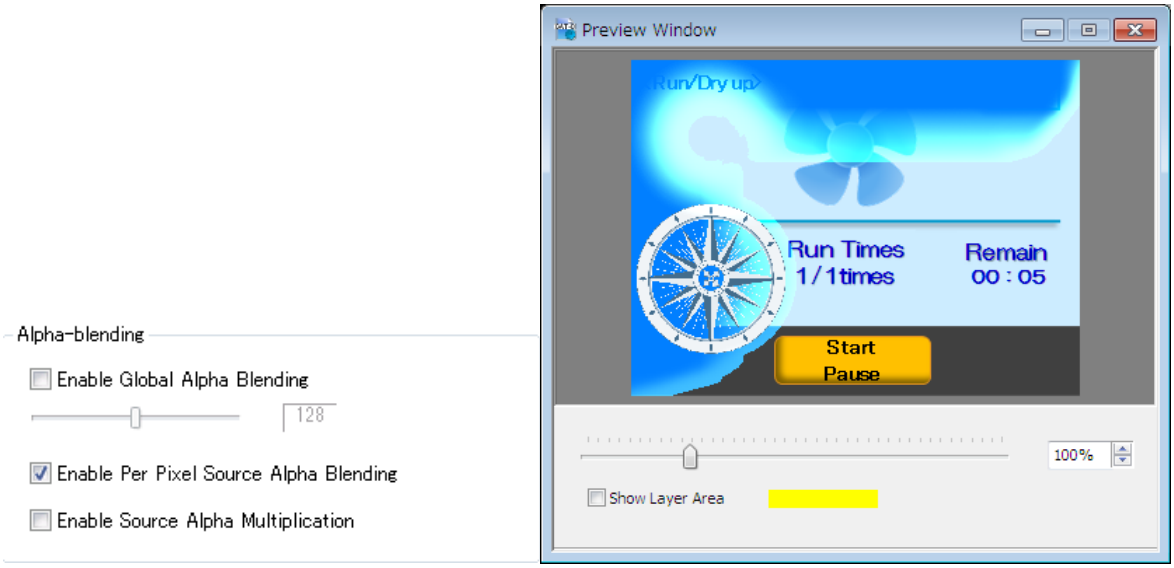
If Csrc window enables only the global alpha blending, the Csrc window is blended with the Cdst window by set the global alpha value. See Figure 5-48 as a preview of global alpha blending. The alpha blending value is 128.

Figure 5-48. Preview Window with Global Alpha Blending 128



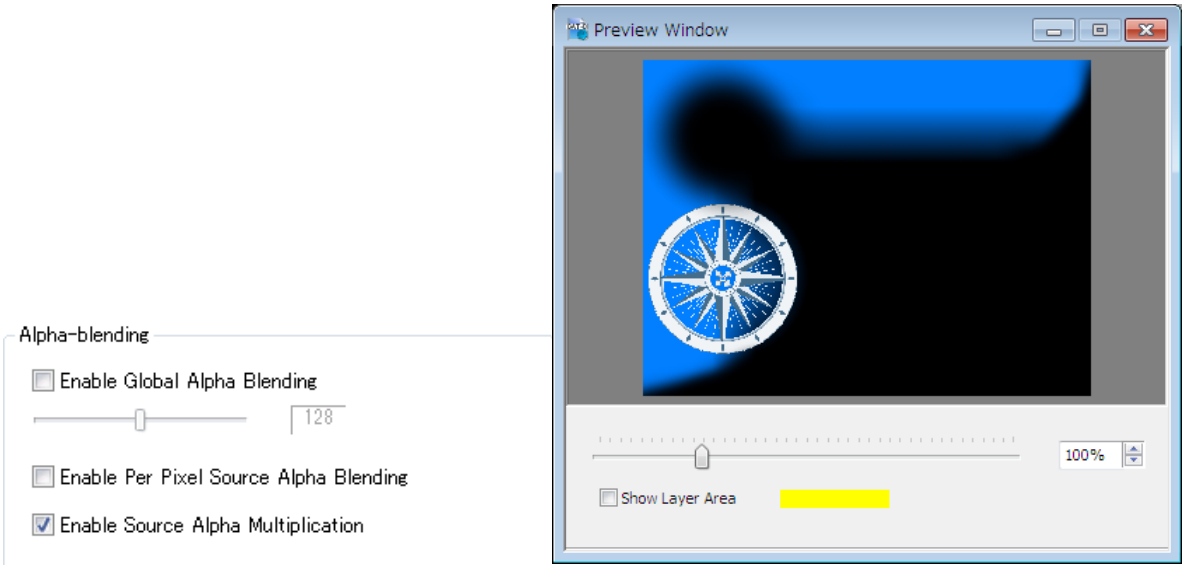

If the Csrc window enables only the per-pixel source alpha blending, the Csrc window is blended with the Cdst window by alpha value of each pixel it owns. See Figure 5-49 as a preview of enable per-pixel source alpha blending.

Figure 5-49. Preview Window with Per-Pixel Source Alpha Blending




If the Csrc window enables only the source alpha multiplication, the alpha value of Cdst is zero, and only the alpha value of the Csrc window is enabled. See Figure 5-50 as a preview of enable source alpha multiplication.

Figure 5-50. Preview Window with Source Alpha Multiplication




## 5.5 Palette Management

This UI is disabled.

## 5.6 Font Management

This UI is disabled.

## 5.7 Font Editing

This UI is disabled.

# 5.8 Flow Design

The Flow Design manages the Event Table and the Action Table.

Action Table manages action, the sequence of drawing for object by page unit.

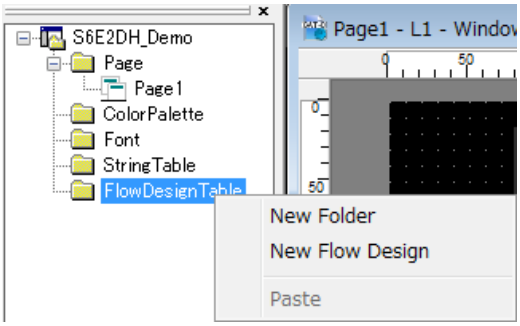
Event Table manages the combination with Action and Event, which indicates an external event such as an input from the touch interface or the hard button.

## 5.8.1 Basic Operations

- **New**

Select the FlowDesignTable folder and right-click. Then select **New Flow Design** in the context menu, as shown in Figure 5-51. Alternatively, choose **Design** > **New** > **Flow Design** in the menu bar.

Figure 5-51. Add a New Flow Design Table




- **Rename**

Select **Rename** in the context menu. See Figure 5-52.

**Note:** The name must be a combination “a-zA-Z_”. However, the first character must not use “0-9_”. The maximum number of characters is 30.

- **Copy**

Select **Copy** in the context menu. See Figure 5-52.

- **Cut**

Select **Cut** in the context menu. See Figure 5-52.

- **Paste**

Select **Paste** in the context menu after doing a **Copy** or **Cut**. See Figure 5-52.

- **Delete**

Select **Delete** in the context menu. See Figure 5-52.

- **Set As Default**

Set the default FlowDesignTable, which is used for compiling the project.

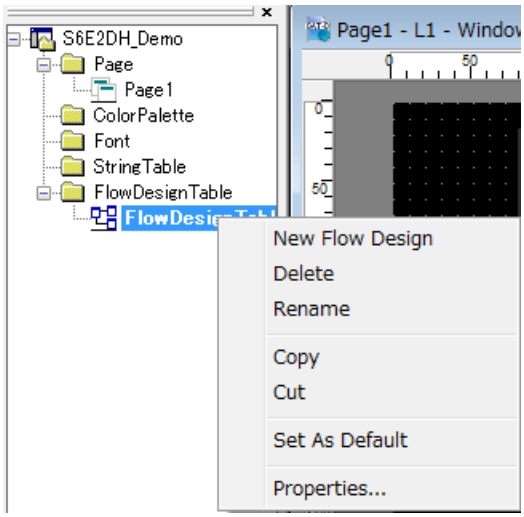
It becomes enabled by selecting **Set As Default** in the context menu. See Figure 5-52.

**Note:** The default FlowDesignTable is displayed in bold type.

- **Properties…**

Display the Flow Design dialog by selecting **Properties…** in the context menu. See Figure 5-52.

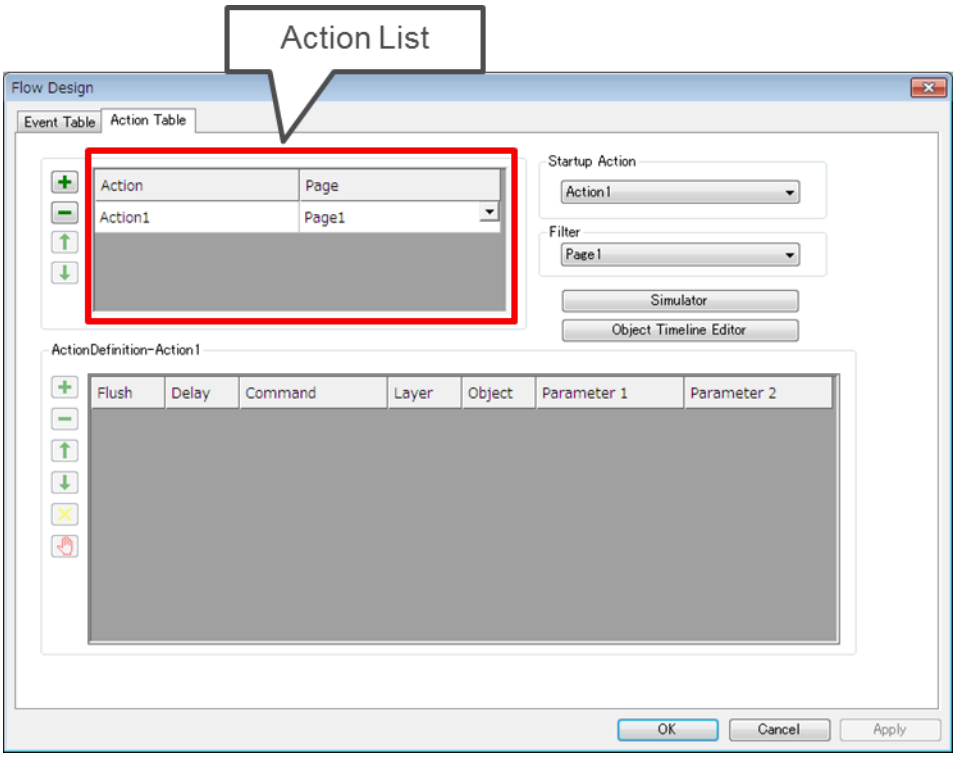
Figure 5-52. Flow Design Table Context Menu




## 5.8.2 Design Action Table

An action defines how to display each object on a page.

Figure 5-53. Design Action Table



- **Action List**

This defines the combination with Action and Page. Action is defined in Timeline Editor.

- icon**:** Adds / deletes the row for Action List
- icon**:** Moves up / down the selected row
- **Action** column：Displays the action name
- **Page** column：Selects the action for combining with a Page

- **Startup Action**

Action to start up as the default when initiating the graphics application

- **Filter**

Filters out the action entry of the unselected page in the Action list

- **Simulator**

Opens the Design Flow Simulator dialog. See Simulation for details.

- **Object Timeline Editor**

Opens the Object Simulator dialog. See Object Timeline Editor for details.

- **Action Definition - XXXXX**

- icon**:** Adds / deletes the row for **Definition-XXXXX**. There should be a one-row definition
- icon**:** Moves up / down the selected row
- **Flush:** Indicates whether to refresh the screen after this action is executed. It must be set “Yes” always.
- **Delay:** Delay time (ms) prior to the execution of this **Action**
- **Command:** It is fixed to **Play SpriteList**. This means that runs the definition in Object Timeline Editor.
- **Layer:** Unused column
- **Object:** Unused column
- **Parameter 1:** Unused column
- **Parameter 2:** Unused column
- icon: Sets the command state of a row to be disabled. See Figure 5-54.
- icon: Sets the command state of a row as a breakpoint. See Figure 5-55.

Figure 5-54. Set a Disabled State

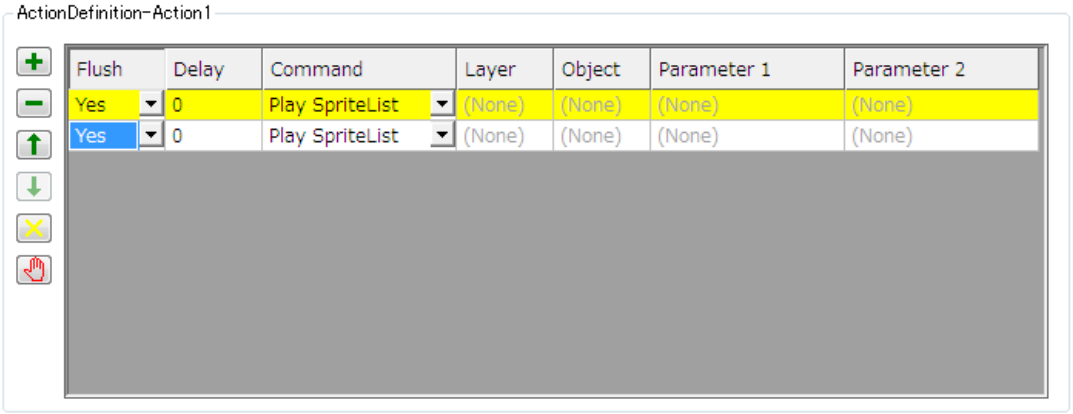
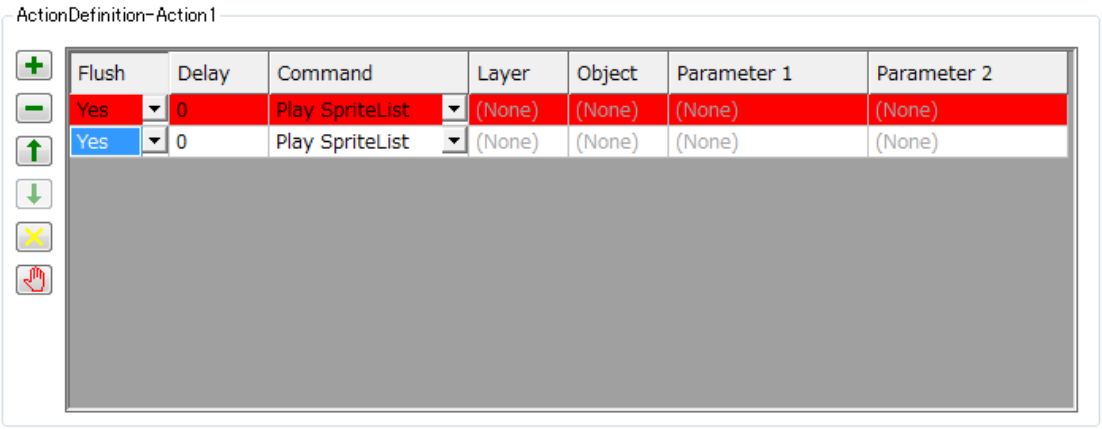


Figure 5-55. Set a Breakpoint

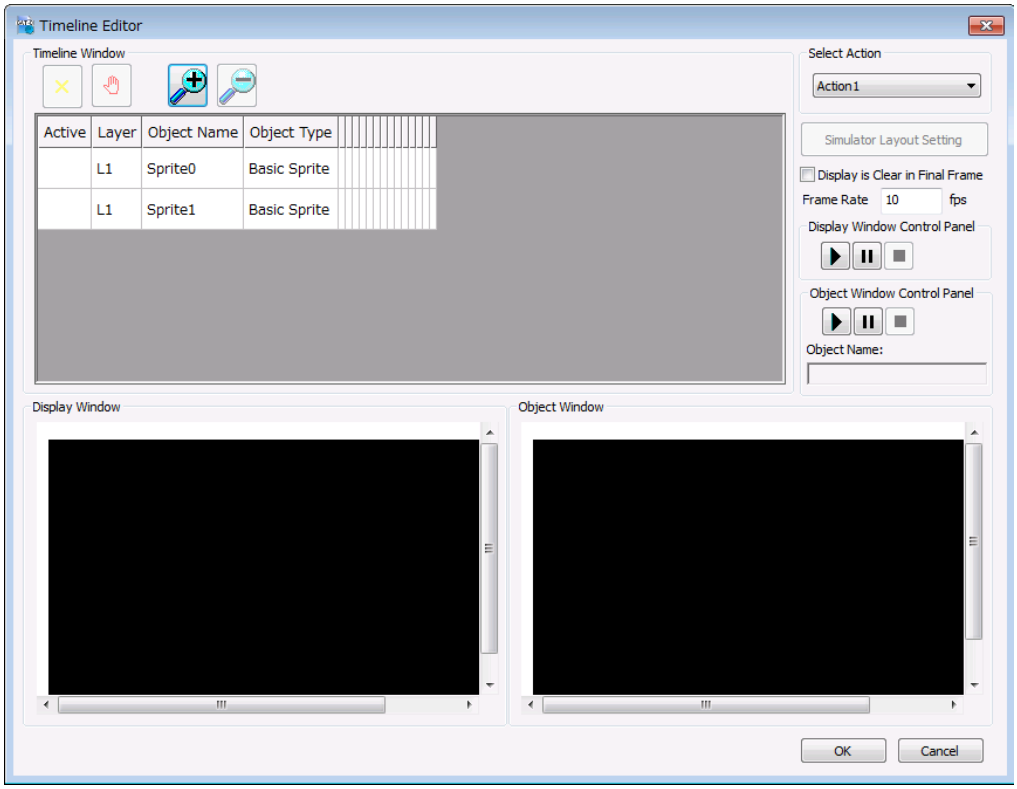



**Note:** The state of the command line cannot be set as disabled and breakpoint at the same time.

### *5.8.2.1 Object Timeline Editor*

This is the flow design dialog for an action. You can design the drawing timing of each object by using the **Timeline Editor**. In addition, the design issue in this dialog is simulated by clicking the **Display Window Control Panel** button.

Figure 5-56. Timeline Editor



- **Timeline Editor**
  - ☐  icon: Disables the operation of the specified object. For a disabled object, the comment row changes to yellow as shown in Figure 5-57. Click again to cancel the disabled state.
  - ☐  icon: Sets the breakpoint to the specified frame. For the frame to which the breakpoint is set, the column changes to yellow, as shown in Figure 5-58. Click again to cancel the breakpoint.
  - ☐  icon: Increases the width of the frame of the **Timeline Window**. The width of the frame can be set according to 10 levels.
  - ☐  icon: Decreases the width of the frame of the **Timeline Window**. The width of the frame can be set according to 10 levels.
  - ☐ **Object Name:** The name of the object specified in the **Timeline Window**, shown in Figure 5-64, is displayed. The object name displayed here becomes the target of the simulation in the object control.
  - ☐ **Object Type:** This is set in the object property.
  - ☐ **Frame Operator Field:** Frame operator is designed in this area as shown Figure 5-64.To edit the frame, right-click in the Timeline Window and operate the frame from the context menu as shown Figure 5-61 and Figure 5-62.

Figure 5-57. Timeline Dialog




Figure 5-58. Breakpoint




Figure 5-59. Zoom Up

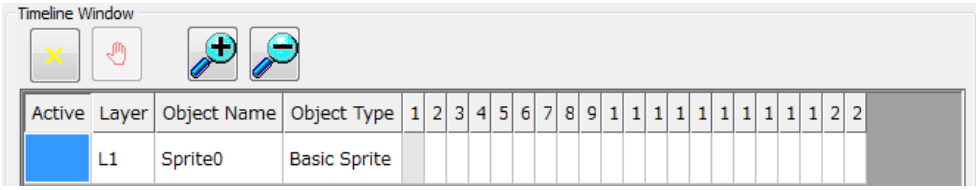



Figure 5-60. Zoom Down



Figure 5-61. Frame Operator (Basic Sprite)

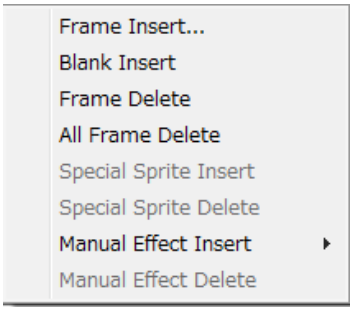
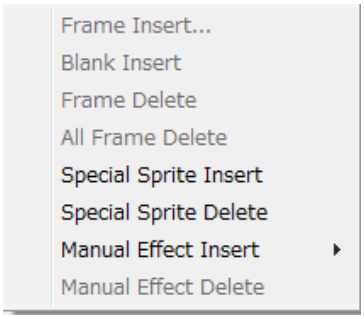



Figure 5-62. Frame Operator (Special Sprite)




- **Select Action**

Select the action definition name. The action name defined in Design Action Table is displayed in the list.

- **Simulator Layout Setting**

N/A

- **Display is Clear in Final Frame**

Selects whether to clear the object display after the final frame of each object is drawn.

- **Frame Rate**

Adjust the display speed before executing the simulation.

The frame rate is not always accurate, so use this setting to adjust the simulation speed.

**Note:** The frame rate is for simulation only; the actual system (S6E2Dx device) is always 60 fps.

- **Display Window Control Panel**

Control the simulation that includes all objects located in the Timeline Window. The simulation result is displayed in the Display Window.

- **Object Window Control Panel**

Control the simulation of the object specified in the Timeline Window. The simulation result is displayed in the Object Window.

The selection of the object as shown Figure 5-63; set by double-clicking in an active column. Click again to cancel the simulation object.

Figure 5-63. Selection for Object

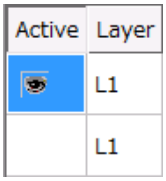
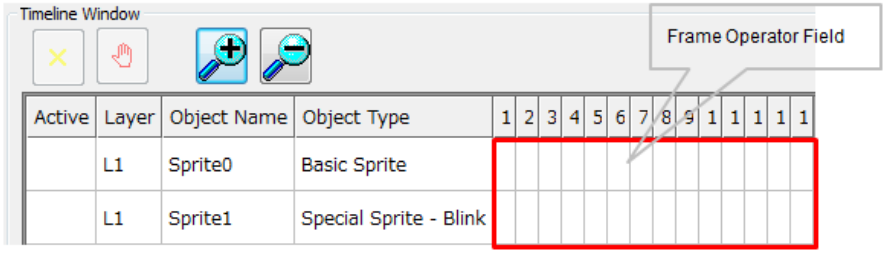



Figure 5-64. Timeline Dialog




- **Display Window**

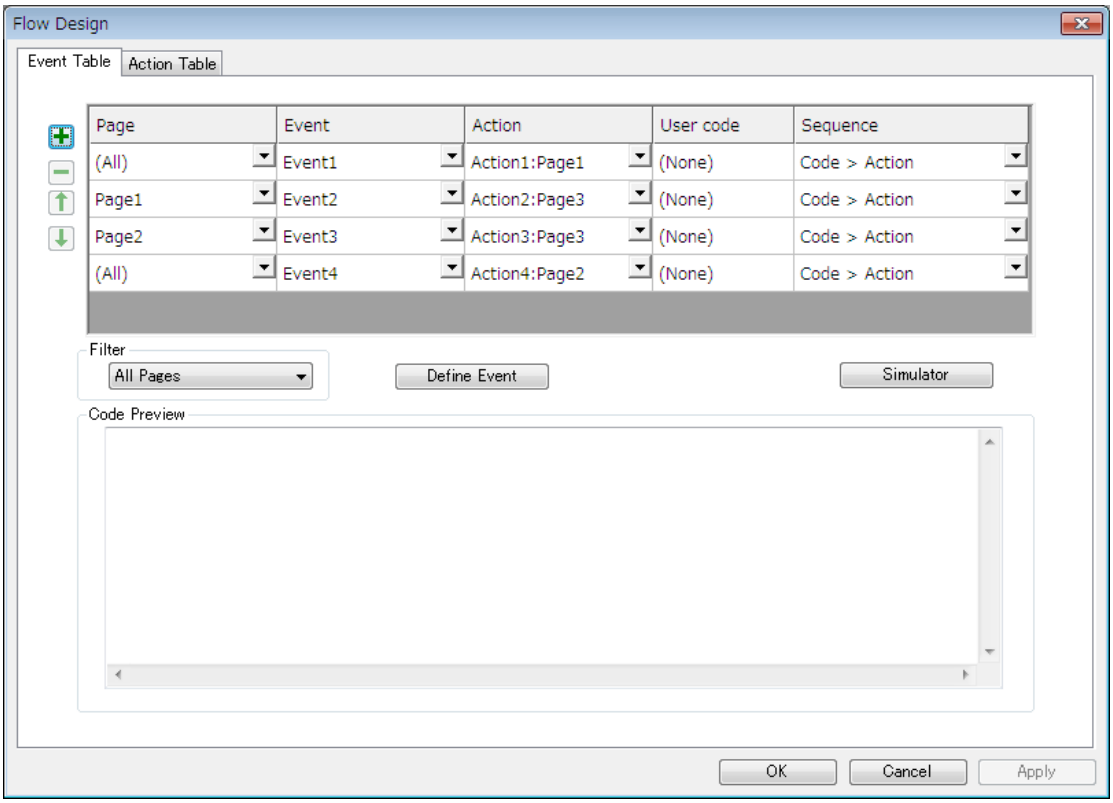
The simulation result targeted for all objects is displayed.

- **Object Window**

The simulation result targeted for the selected object is displayed.

## 5.8.3 Design Event Table

Figure 5-65. Design Event Table



- Event List
  - icon: Adds / deletes a row
  - icon: Moves up / down the selected row
  - **Page:** Selects and sets the page on which the event is effective.
  - **Event:** Selects and sets the name of the event
  - **Action:** Selects and sets the action corresponding to the event
  - **User code:** Double-click the cell to open the User Code dialog box. You can input standard C source code here.
  - **Sequence:** Generates the sequence of user code and event code in code generation. When the Sequence selected is Code > Action, the code will be implemented before the action display. If you want to implement it after the action display, select **Action** > **Code** as shown in Figure 5-68

Figure 5-66. User Code Dialog Box

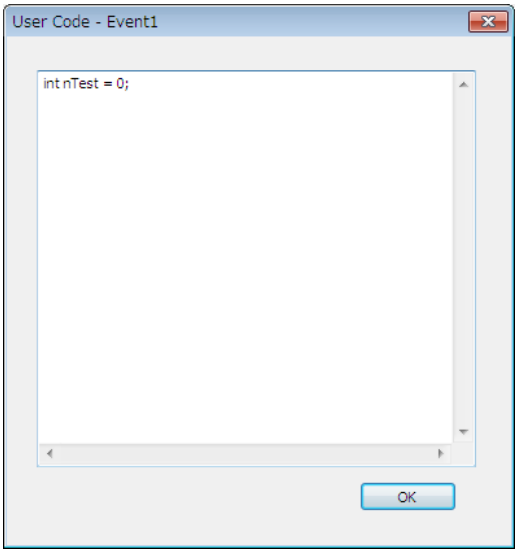


Figure 5-67. Edited Code View

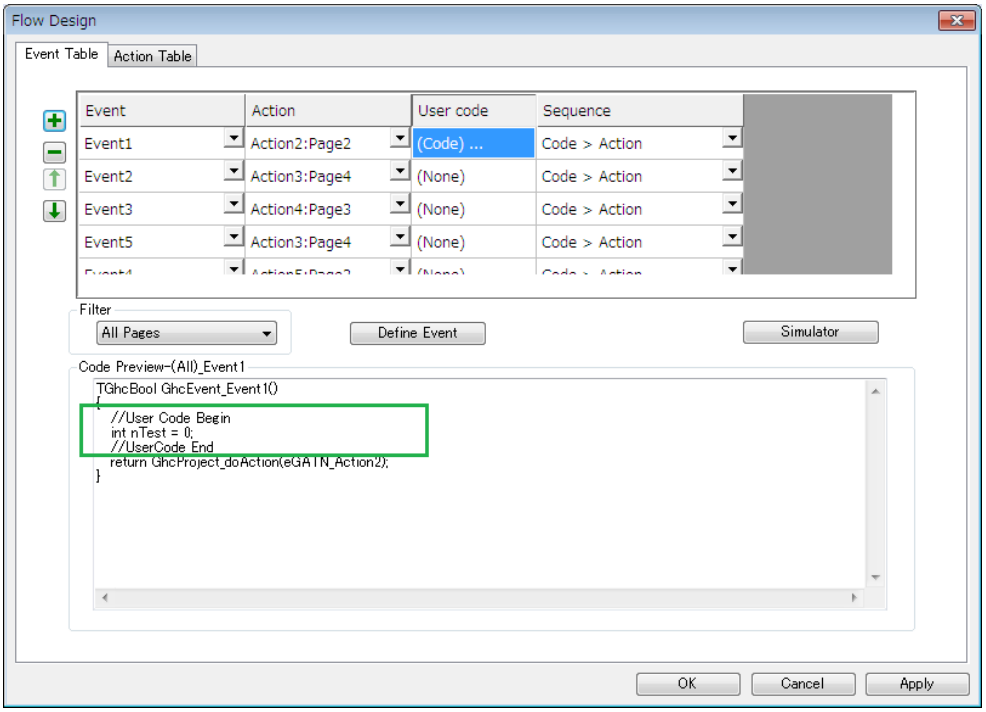
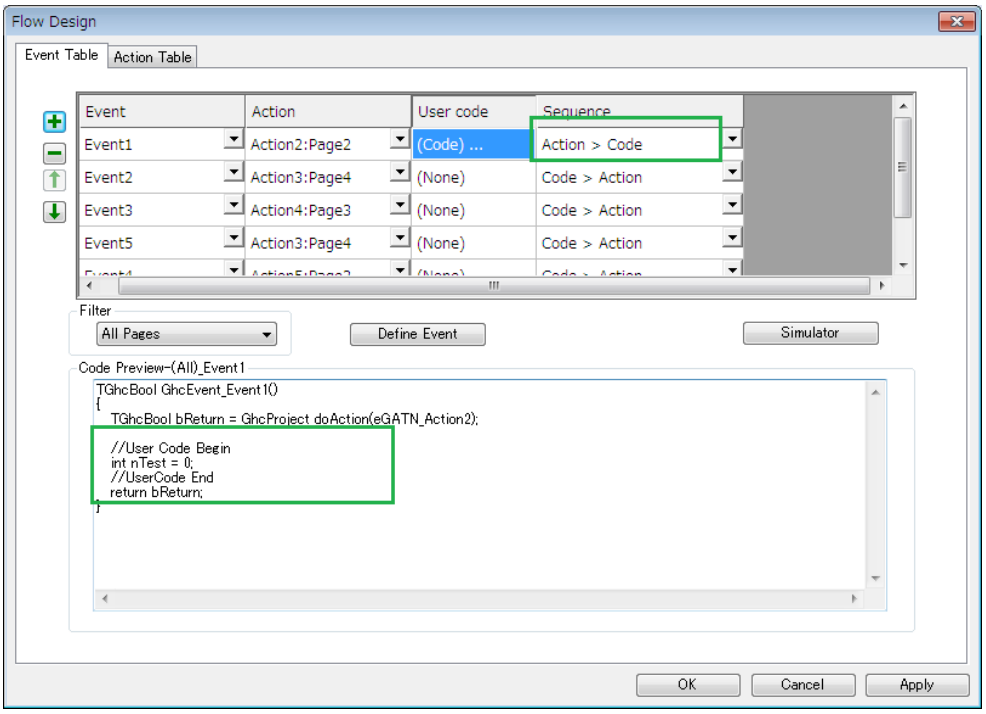



Figure 5-68. User's Code Order



- **Filter**

Filters out the page defined in the event list to be the event entry of the selected page. Lists all page names in the project and **All Pages**.

- **Define Event**

Defines the event. See Define Event for details.

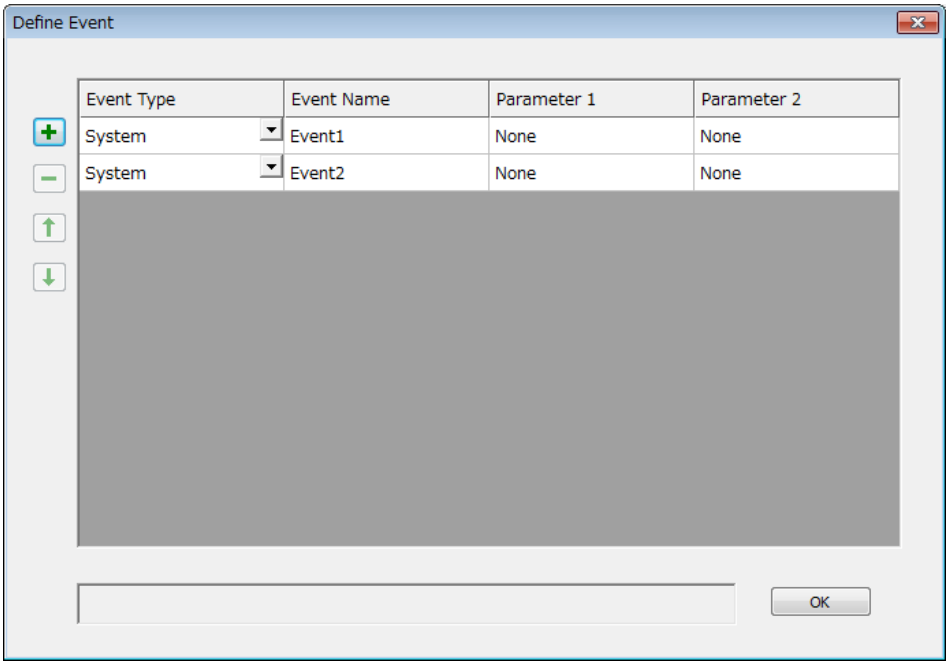
- **Simulator**

Opens the Design Flow Simulator window; see Simulation for details.

**Note:** One action can be shared by more events, and one event can be shared by many pages. If all pages share one event, then this event is not allowed to be assigned to specific pages.

### *5.8.3.1 Define Event*

Figure 5-69. Define Event




- 

Adds, deletes, moves up, and moves down.

- **Event Type**

Event Type includes System, Hardware, and Object. But this parameter is a label only. Setting it has no effect.

- **Event Name**

Name of the event

- **Parameter 1**

This must not set parameter.

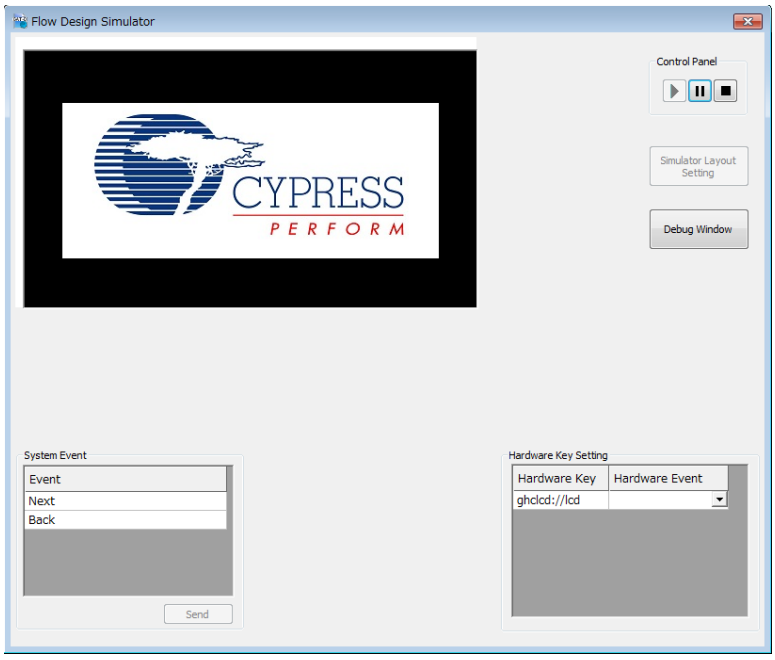
- **Parameter 2**

This must not set parameter.

## 5.9 Simulation

The created Flow Design Table enables you to display a simulation on the simulator. You can open the Flow Design Simulator dialog by clicking the Simulator button on both the Event Table and Action Table tabs.

Figure 5-70. Flow Design Simulator Dialog




If run this simulation, the startup action is started. Then, enable to run the event action on the display by clicking the Send button with selecting Event in the System Event.

- **Control Panel**
  - **Play**

    Click  to conduct the simulation.
  - **Suspend**

    Click  to suspend the simulation.
  - **Stop**

    Click  to stop the simulation.

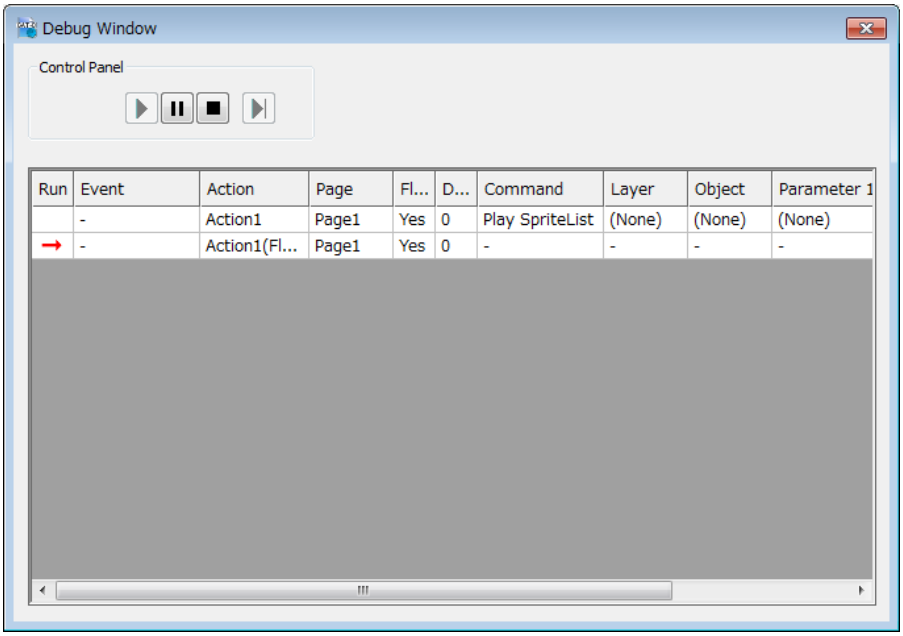
- **Simulator Layout Setting**

This UI is disabled.

- **Debug Window**

Open the Debug Window for the command. You can trace the current action line by line.

Figure 5-71. Debug Window




- **System Event**

All the system events defined in the Event Table will appear in the System Event area. You can select an event and click Send to send the event.

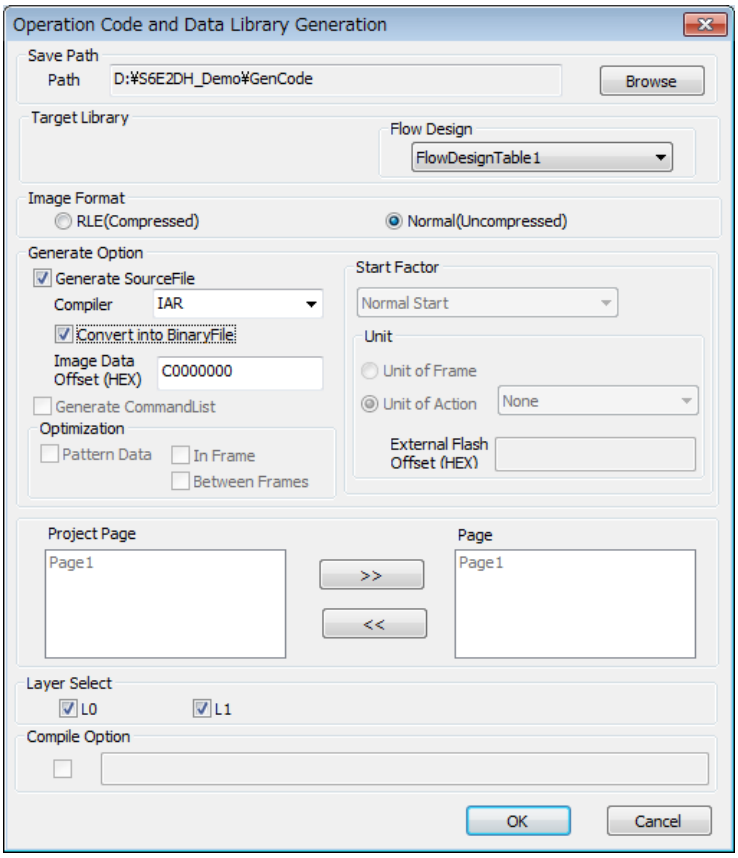
- **Hardware Key Setting**

This UI is disabled.

## 5.10 Code Generation

GAT-D converts its own projects into the embedded source codes for the S6E2Dx series via the Operation Code and Data Library Generation dialog. To display this dialog, choose **Compile** > **Resource** in the menu bar.

Figure 5-72. Operation Code and Data Library Generation Dialog




- **Save Path**

Sets the path for saving the generated code. The C source file and the library will be saved in the GenCode folder under the path of the GAT-D project as a default. When you click the **Browse** button, the dialog box for setting the path is displayed.

- **Target Library**

This UI is disabled.

- **Flow Design**

Selects the Flow Design Table used.

- **Image Format**

Select the image data format. If you select **RLE (compressed)**, the image data of objects is compressed according to Table 5-5.

Table 5-5. Image Data Compression Decision

| Condition on GAT-D | | | Compression Decision |
|---|---|---|---|
| Multi-Window (Layer) | Blend-Operator (Window) | Rotation/Reverse (Object) | |
| ✓ | ✓ | ✓ | – |
| ✓ | - | ✓ | - |
| - | ✓ | ✓ | - |
| - | - | ✓ | - |
| ✓ | ✓ | - | ✓ |
| ✓ | - | - | - |
| - | ✓ | - | ✓ |
| - | - | - | ✓* |

* In this condition, only the maximum-size object is compressed. It is restricted by hardware. Note that this condition enables to locate one object into each layer (Sum is two objects).

- **Generate Option**
  - ☐ **Generate SourceFile**

    When you select this option, the generate source files are output. Thus, do not change it from the default.
  - ☐ **Compiler**

    This pull-down list has no impact.
  - ☐ **Convert into BinaryFile**

    When you select this option, the image data of objects are converted to a binary file. The other parts are converted to the embedded source files. If enabling it, the offset address of binary must be set. The default address is 0xC0000000.
  - ☐ **Image Data Offset (HEX)**

    Set the offset address of binary. The default is 0xC0000000.
  - ☐ **Generate CommandList**

    This UI is disabled.

- **Optimization**
  - ☐ **Pattern Data**

    This UI is disabled.
  - ☐ **In Frame**

    This UI is disabled.
  - ☐ **Between Frames**

    This UI is disabled.
  - ☐ **Start Factor**

    This UI is disabled.

- **Unit**

  This UI is disabled.

- **Layer Select**

  The source files of the selected layer are output.

- **Compile Option**

  This UI is disabled.

**Note:** If layers selected in the **Action Table** (see Design Action Table) are not selected here, the source files will not be generated.

# Appendix A

GAT-D V01 supports the following color modes.

RGB888a (ARGB8888)

| 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | A | A | A | A | A | A | A | R | R | R | R | R | R | R | R |
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| G | G | G | G | G | G | G | G | B | B | B | B | B | B | B | B |

RGB565 (RGB565)

| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | R | R | R | R | G | G | G | G | G | G | B | B | B | B | B |

RGB555a (ARGB1555)

| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | R | R | R | R | R | G | G | G | G | G | B | B | B | B | B |

RGB444a (ARGB4444)

| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | A | A | A | R | R | R | R | G | G | G | G | B | B | B | B |

**Note:** A – Alpha, R – Red, G – Green, B – Blue, Index – Index value, B/W only – Black/white only

# Revision History

## Document Revision History

| Document Title: Graphics Authoring Tool for S6E2Dx Series Guide<br>Document Number: 002-04385 | | | |
|---|---|---|---|
| **Revision** | **ECN No.** | **Origin of Change** | **Description of Change** |
| ** | – | TOMY | New guide |
| *A | 5092298 | SXKA | Updated for SP1<br>Changed to Cypress style from Spansion style<br>Changed the section names<br>Added supplementary explanation in each section<br>Section 1: Added system summary picture<br>Section 2: Changed the installation flow<br>Section 3: Changed the creation flow for SP1 and removed an extra step<br>Section 4: Removed CLUT feature parts<br>Section 5: Removed Palette and Font parts<br>Added new feature parts (Rotation and Resize for sprite object and Compression ) |