

Document information

Information	Content
Keywords	GUIGUIDERUG
Abstract	The GUI Guider is built on the Light and Versatile Graphics Library



1 Introduction

The GUI Guider is built on the Light and Versatile Graphics Library (LVGL) library. GUI Guider provides an IDE to design embedded graphic application UI using drag and drop widgets and helps in the editing process. The software facilitates the UI design for graphic application on embedded devices.

This document describes GUI Guider and targets embedded GUI Application developers with a basic knowledge of C on NXP MCU devices.

The major sections of this user guide are:

- Introduction — General information and feature list of GUI Guider.
- Installation — Steps to install the software and set up the environment.
- GUI Guider Usage — Steps to use GUI Guider and design GUI Application.
- Widget Details — Description of supported widgets and attributes.
- Event Details — Supported events and actions of each widget.
- LVGL hardware acceleration — Steps to use PXP/VGLite hardware acceleration.
- Performance — Introduces the performance monitor function and tips for performance optimization for NXP MCU devices.
- Debug GUI Guider project — Description of how to debug GUI applications designed by GUI Guider in supported IDE and toolchain.
- MicroPython — Introduces how to design GUIs, generate MicroPython code, and run Python code in a simulator.
- Porting RTOS — Steps to port source code of GUIs for variant RTOS, build, and deploy binary image on NXP MCU.
- Frequently Asked Questions (FAQs) — Frequently asked questions and answers.

1.1 Supported features

- IDE
 - Supports Windows 10, MacOS 11 and Ubuntu 20.04
 - Multi-language (English, Chinese) for IDE
 - Multi-LVGL-version (v7.10.1, v8.2.0)
 - LVGLC and Micropython code auto-generation
 - RT-Thread RTOS (Real-Time Operating System)
 - Compatible with MCUXpresso IDE v11.6.x, MCU SDK 2.21.x, and IAR 9.30.1, Keil MDK 5.37.0
 - Project management: create, import, edit, delete
 - Wizard of creating a new project
 - GUI auto-scaling (auto ratio, custom ratio)
 - Configurable display type with custom option
 - 16-bit and 24-bit color depth support
 - What You See Is What You Get (WYSIWYG) UI design by drag and drop
 - Multi-page application design
 - Shortcut of bring forward and backward, copy, paste, delete, undo, redo
 - Code viewer for UI definition JSON file, C code, and Micropython code.
 - Navigation bar to view the selected source file
 - Widget attributes group and setting, widgets group move
 - Screen preview and copy function, default screen setting mouse
 - GUI editor zoom in and zoom out, control by mouse scroll

- Multiple fonts support and third-party fonts import
- Customizable Chinese character scope
- Widgets alignment: horizontal (top, center, and bottom), vertical align (left, center, and right), alignment line
- PXP and VGLite acceleration enable and disable
- Support the CPU/FPS monitor
- Supports default style and custom style
- Integrated demo applications
- Information window: project info, memory info and real-time log
- Flexible font size
- Events for list buttons
- Memory leak check
- Optimization level options: size, speed, balance
- Widgets
 - V7 supports 32 widgets
 - Button (5): button, image button, checkbox, button group, switch
 - Form (4): label, drop-down list, text area, calendar
 - Table (9): table, tab, message box, container, chart, canvas, list, window, titleview
 - Shape (7): arc, line, roller, led, spinbox, color picker, spinner
 - Image (3): image, animation image, 3D image
 - Progress (2): bar, slider
 - Gauge (2): gauge, line meter
 - V8 supports 38 widgets
 - Button (6): button, image button, checkbox, button group, switch, radio button
 - Form (5): label, spangroup, drop-down list, text area, calendar
 - Table (10): table, tab, message box, container, chart, canvas, list, window, titleview, menu
 - Gauge (2): meter, digital clock
 - Shape (7): arc, line, roller, led, spinbox, color picker, spinner
 - Image (3): image, animation image, 3D image
 - Progress (2): bar, slider
 - Advanced (2): analog clock, carouse
 - Shadow setting
 - Common functions
 - Animation: animation image, GIF to animation, animation easing, and [animation path](#)
 - Support event trigger and action selection, custom action code
 - Support tileview design by drag and drop operation in editor
 - Support parent/child hierarchy for carousel container, tabview, and tileview
 - Supports two widgets theme:
 - Default
 - Dark
 - Support four IDE themes:
 - Dark Blue
 - Light Blue
 - Light
 - Dark

- Chinese display and Chinese input
- Support fonts:
 - .simsun
 - .arial
 - .montserratMedium
 - .Abel_regular
 - .Acme_Regular
 - .Adventpro_regula
 - .AguafinaScript_Regular
 - .Alatsi_Regular
 - .AlexBrush_Regular
 - .AmaticSC_Regular
 - .Amiko_Regular
 - .Antonio_Regular
 - .ArchitectsDaughter
- Target devices
 - NXP i.MX RT595, i.MX RT1010, i.MX RT1015, i.MX RT1020, i.MX RT1024, i.MX RT1050, i.MX RT1062, i.MX RT1064, i.MX RT1160, and i.MX RT1170 (portrait mode and landscape mode)
 - NXP LPC54S018, LPC54628, LPC55S28, LPC55S16, LPC54S018m, and LPC55S69
 - External flash storage for LPC54628

Board	Verified display part number
MIMXRT1011xxxxx	adafruit-1947
MIMXRT1052xxxxB	RK043FN02H-CT, RK043FN66HS-CTG
MIMXRT1062xxxxA	RK043FN02H-CT, RK043FN66HS-CTG
MIMXRT1064xxxxA	RK043FN02H-CT, RK043FN66HS-CTG
MIMXRT1176xxxxx	RK055AHD091, RK055MHD091
MIMXRT595S	G1120B0MIPI, Mikroe TFT Proto 5", RK055AHD091, RK055MHD091
LPC54S018	RK043FN02H-CT, RK043FN66HS-CTG
LPC54S018J4M	RK043FN02H-CT, RK043FN66HS-CTG
LPC54628	RK043FN02H-CT, RK043FN66HS-CTG
LPC55S69	adafruit-1947
MIMXRT1021xxxxx	adafruit-1947
LPC55S28	adafruit-1947
LPC55S16	adafruit-1947
MIMXRT1024xxxxx	adafruit-1947
MIMXRT1166xxxxx	RK055AHD091, RK055MHD091
MIMXRT1015xxxxx	adafruit-1947

- Device template, auto-build, and auto-deploy for supported platforms

1.2 Hardware requirement of LVGL application

Every modern controller which is able to drive a display is suitable to run LVGL. The minimal requirements are:

- 16, 32, or 64-bit microcontroller or processor.
- 16 MHz clock speed is recommended.
- Flash/ROM: > 64 kB for the very essential components (> 180 kB is recommended).
- RAM:
 - Static RAM usage: ~2 kB depending on the used features and object types.
 - Stack: > 2 kB (> 8 kB is recommended).
 - Dynamic data (heap): > 4 kB (> 32 kB is recommended if using several objects). Set by LV_MEM_SIZE in lv_conf.h.
 - Display buffer: > "Horizontal resolution" pixels (> 10 × "Horizontal resolution" is recommended).
 - One frame buffer in the MCU or in an external display controller.
- Basic C (or C++) knowledge: pointers, structures, and callbacks.

Note: Memory usage may vary depending on architecture, compiler, and build options.

2 Installation

This section describes the prerequisites and steps to install GUI Guider.

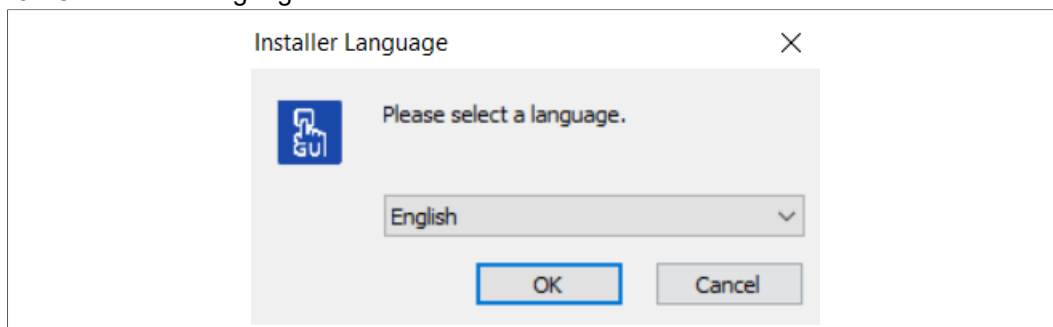
2.1 Prerequisites of Windows 10

- PC with Windows 10
- Java Runtime Environment, JRE-8 is verified

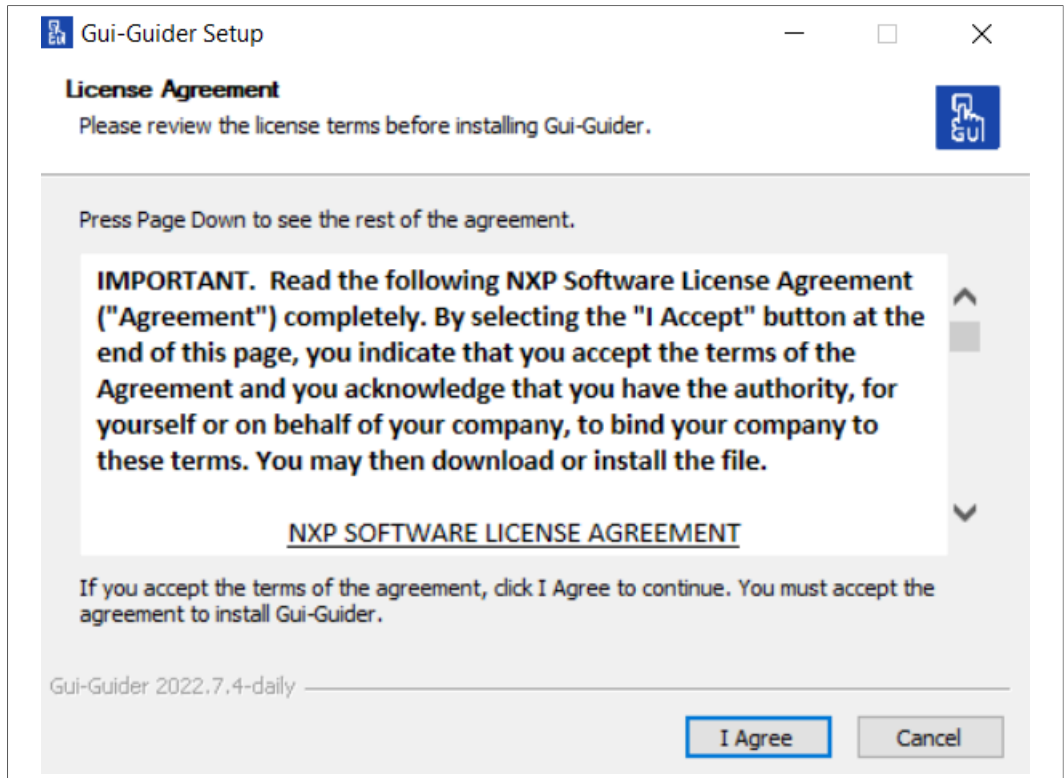
2.2 Install GUI Guider on Windows 10

To install GUI Guider on Windows 10, perform the following steps.

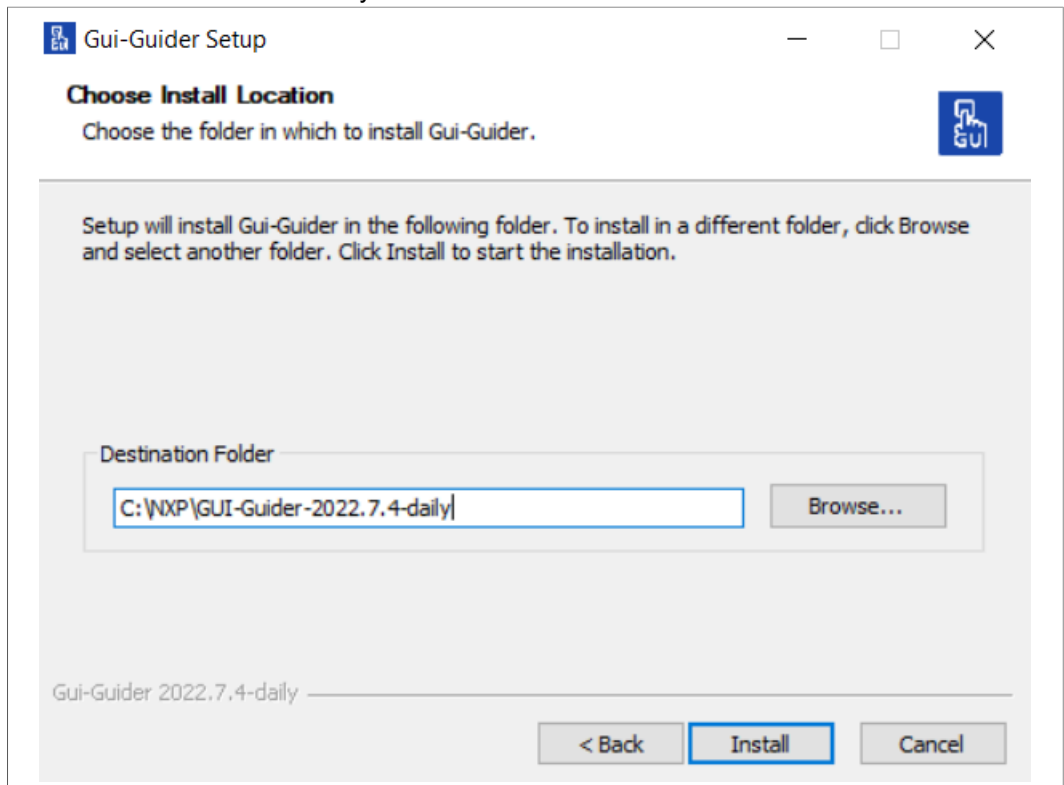
1. Download the installer from www.nxp.com/gui-guider.
2. Double-click the installer to install the software.
3. Choose the language.



4. Accept the terms of the agreement.



5. Select the location where you want to install Gui-Guider.



2.3 Set up runtime environment on Windows 10

This section describes the steps to install Java Runtime Environment and the Git command-line tool.

2.3.1 Install Java Runtime Environment

If your computer does not have JRE installed, perform the following steps.

1. Get the OpenJDK source package from <http://jdk.java.net/archive/>.
2. Extract the zip file into a folder, for example, C:\Program Files\Java\. The extraction creates a jdk-16 folder with a sub folder named bin. However, you may require administrator privileges to extract the zip file to the location.
3. Set the `PATH` environment variable.
 - a. Select **Control Panel**.
 - b. Click **System**.
 - c. Select **Advanced system settings**.
 - d. Click the **Advanced** tab.
 - e. Click the **Environment Variables** button.
The **Environment Variables** dialog box appears.
 - f. Locate the `PATH` variable.
 - g. Click the **Edit** button.
 - h. Click the **New** button.
 - i. Add the location of the bin folder of the JDK installation. For example, C:\WINDOWS\system32;C:\WINDOWS;" C:\Program Files\Java\jdk-16\bin".
4. Set a new system variable `PATH` as `JAVA_HOME`:
 - a. Under the **System variables**, click **New**.
The **New System Variable** dialog box appears.
 - b. Enter the **Variable name** as `JAVA_HOME`.
 - c. Enter the **Variable value** as the installation path of the JDK (without the bin subfolder. For example, C:\WINDOWS\system32;C:\WINDOWS;" C:\Program Files\Java\jdk-16").
 - d. Click **OK** to save the changes.
 - e. Click **OK** to close the **Environment Variables** dialog box.
Your environment is set now.
5. Open the command prompt and type `java -version` and see if it prints the version of the newly installed JDK.

2.4 Uninstall GUI Guider on Windows 10

To uninstall GUI Guider on Windows, perform the following steps.

1. Open **Control Panel > Programs and Features**.
2. Select **Gui-Guider-<version>** and click **Uninstall**.

2.5 Prerequisites of Ubuntu 20.04

- PC with Ubuntu 20.04

2.6 Install GUI Guider on Ubuntu 20.04

1. Download the installer from www.nxp.com
2. Run command to install the software.

```
$ sudo apt install ./Gui-Guider-Setup-1.0.0-GA.deb
```

2.7 Uninstall GUI Guider on Ubuntu 20.04

Run the following command in the command-line tool.

```
$ sudo apt remove gui-guider
```

2.8 Prerequisites of MacOS

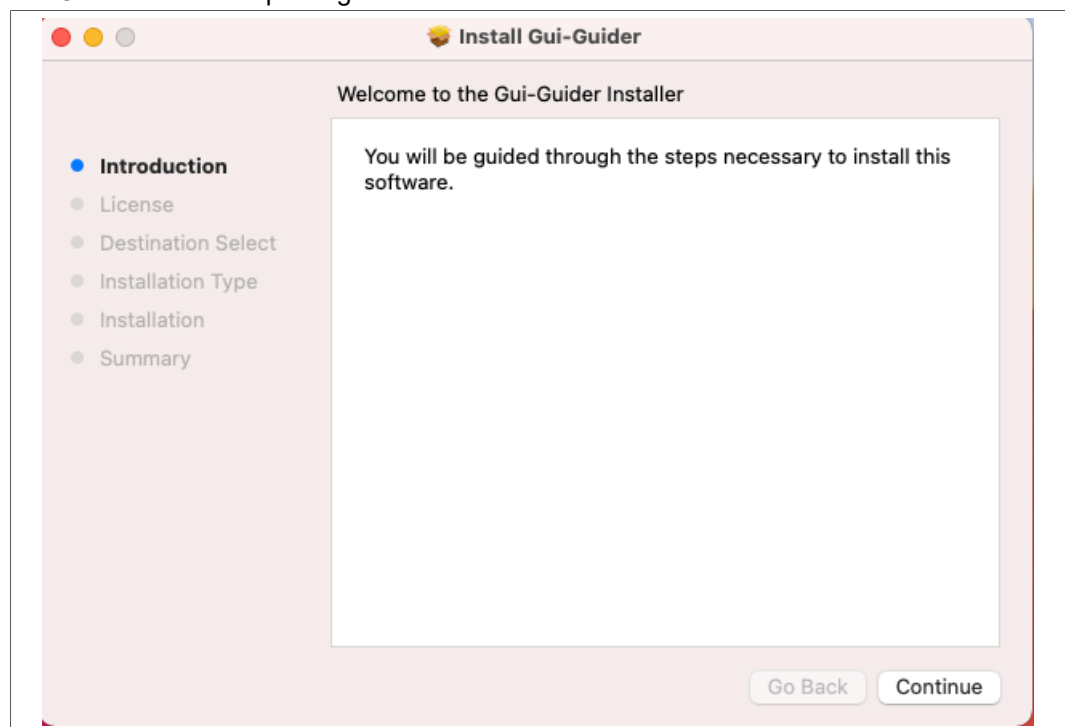
The following steps are required before installing GUI Guider on MacOS:

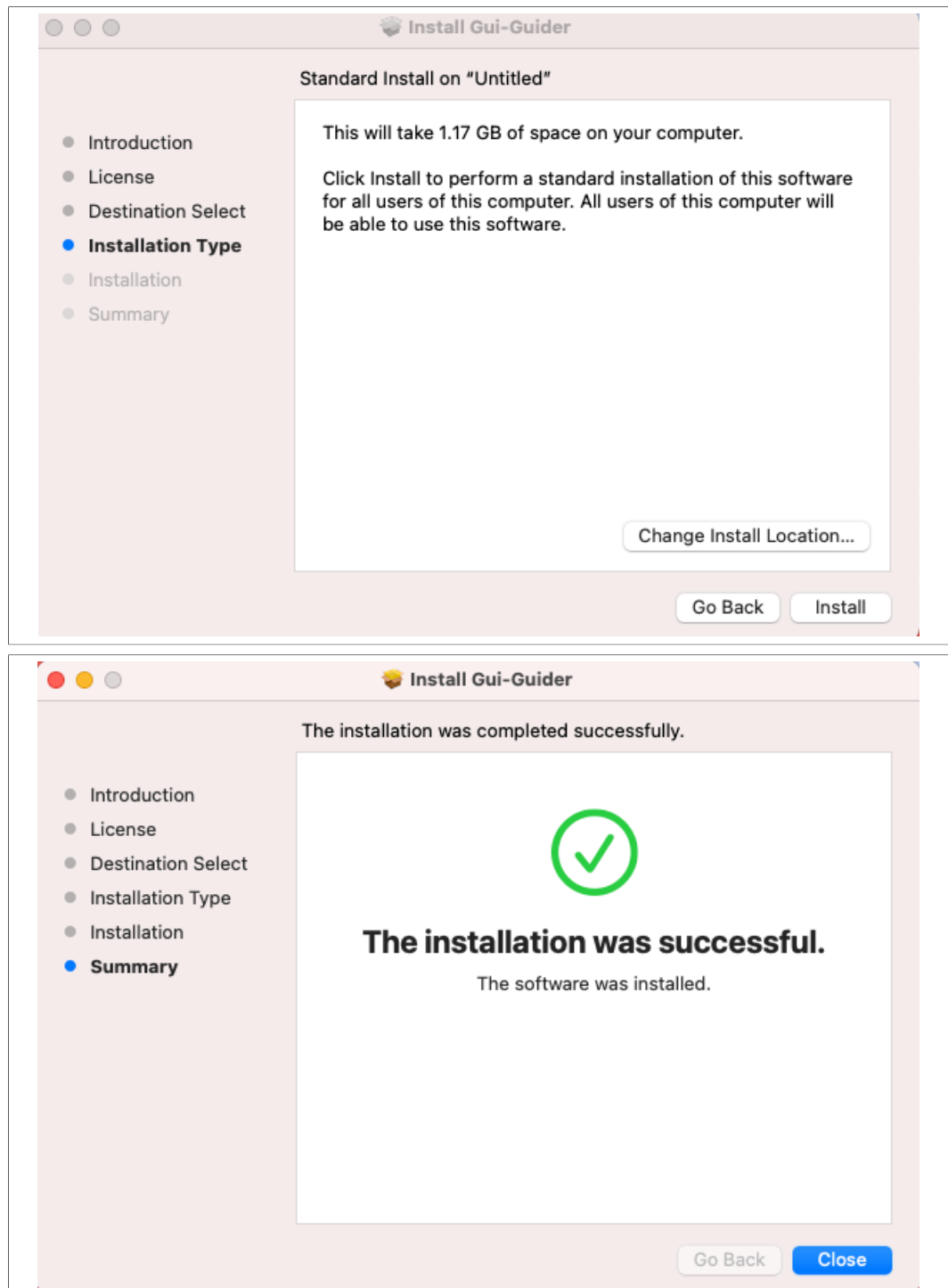
1. Install the version compatible with the OS Xcode.
2. Install the brew.
3. Use brew install JRE, SDL2, and cmake
4. Install the MCUXpresso IDE.

2.9 Install GUI Guider on MacOS

To install GUI Guider on MacOS, perform the following steps.

1. Download the installer from www.nxp.com.
2. Click the installer package.





2.10 Uninstall GUI Guider on MacOS

To uninstall GUI Guider on MacOS run the following command.

```
$ rm -r /Applications/Gui-Guider.app
```

3 Usage

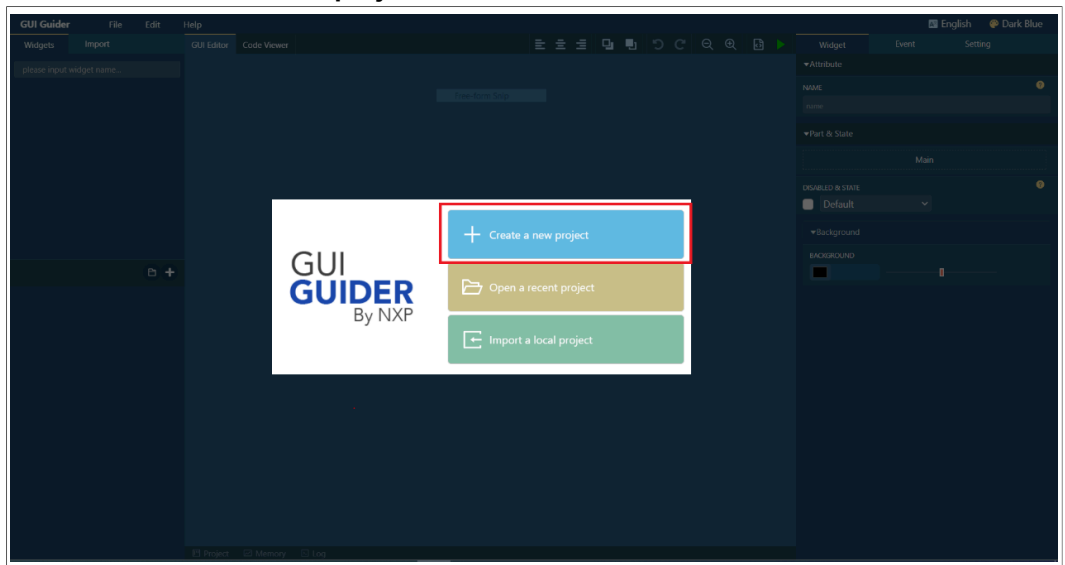
When GUI Guider is launched, the following options appear.

- Create a new project: Wizard to create a new project.
- Open a recent project: Enables you to open a project from recent projects list.
- Import a local project: Enables you to import a project from the local disk.

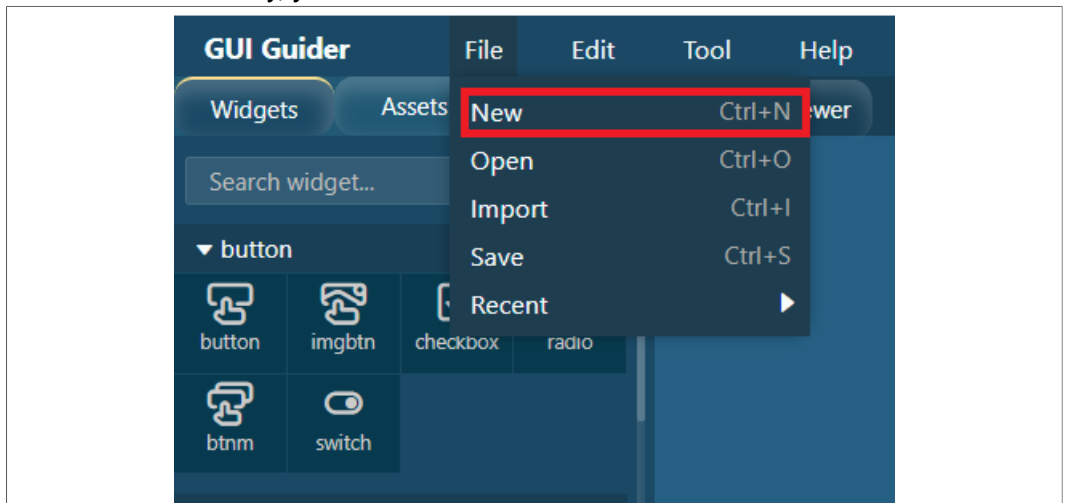
3.1 Create a new project

To create a new project, perform the following steps.

1. Click the **Create a new project** button.



Note: Alternatively, you can select **File > New** in the GUI editor.

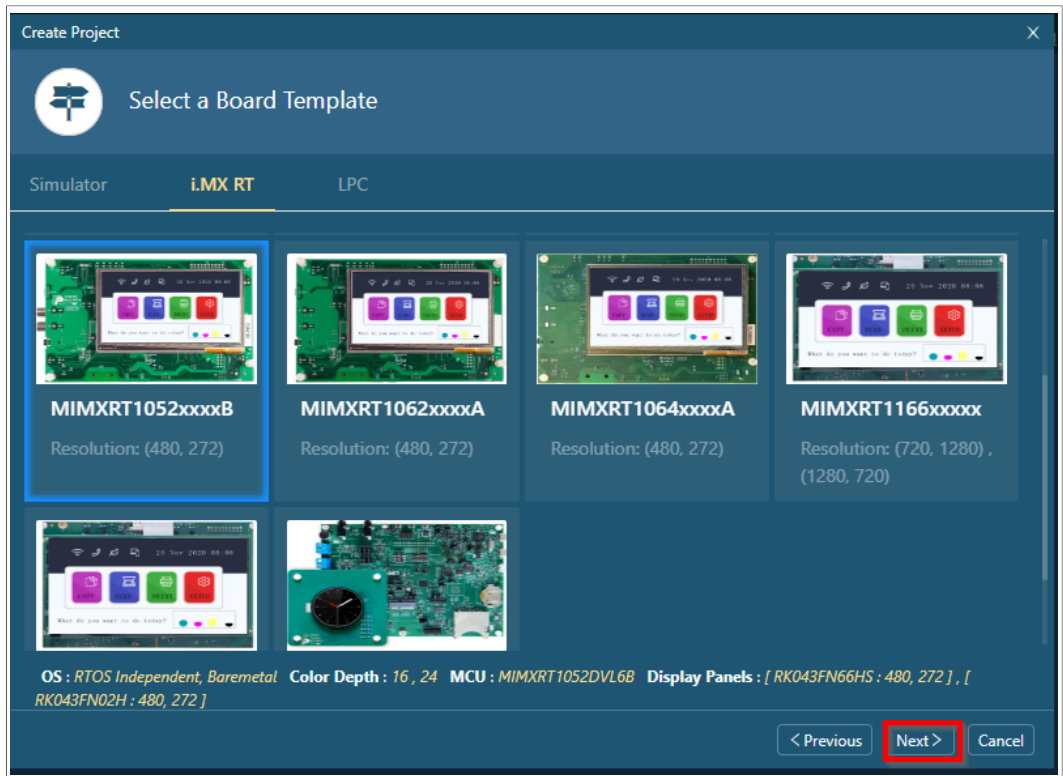


*The **New Project** wizard dialog box appears.*

2. Select the LVGL version that you want to use. For example, v8.

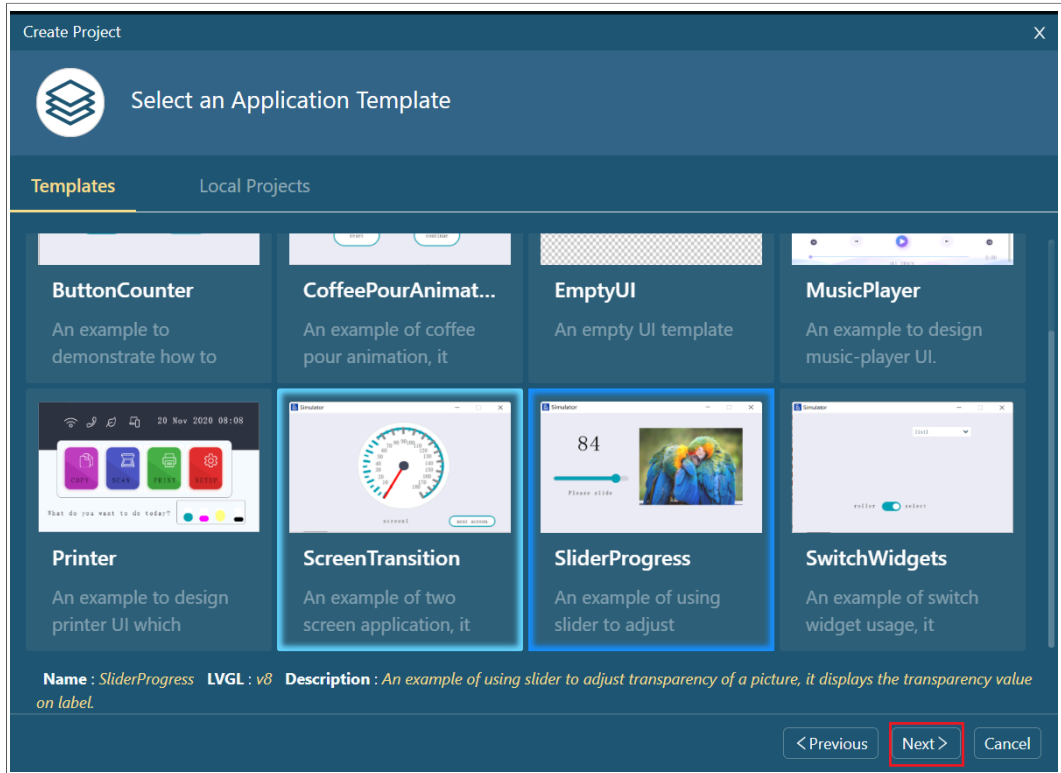


3. Click **Next** or double click.
The **Select a Board Template** page of the wizard appears.
4. Click the **Simulator**, **i.MX RT**, or **LPC** tab and select a board from the template list.
For example, select MIMXRT1052xxxxB.
5. Click **Next** or double click.



The **Select an Application Template** appears.

6. Select a GUI application template, For example, SliderProgress.

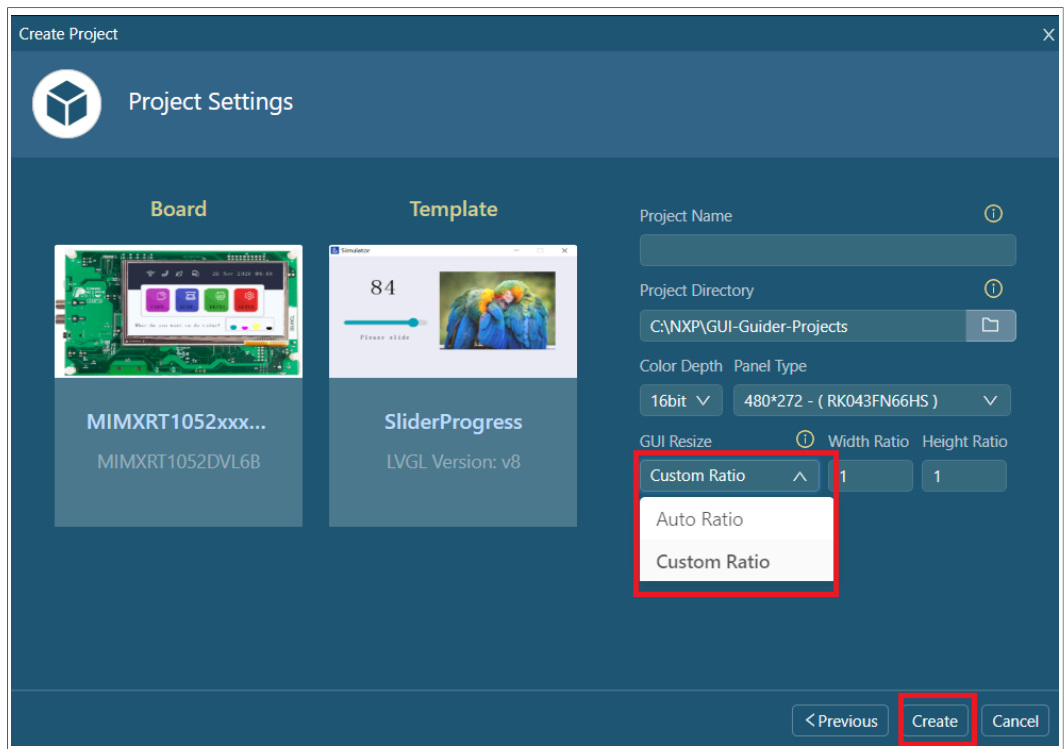



7. Click **Next** or double click.

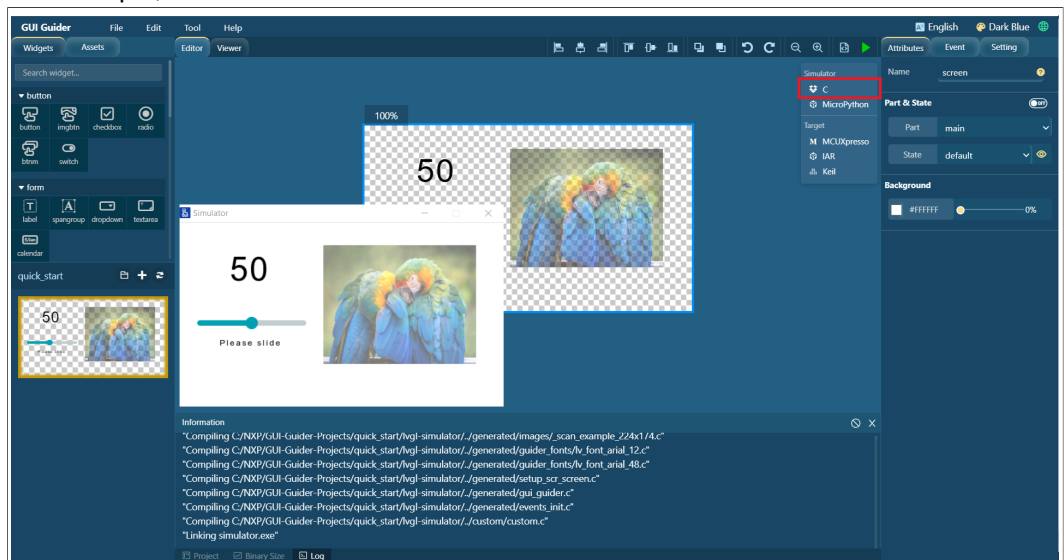
The **Project Settings** page appears.

8. Configure the basic information of the project, including **Project Name**, **Project Directory**, **Panel Type**, **Color Depth**, and **GUI Resize**.

Note: To ensure that the GUI application is displayed normally on the board, select **Auto Ratio**. To customize the size of the application display, set the scaling ratio of width and height in custom ratio.



9. Click **Create**.
The project appears in the **Editor** tab.
10. To run the GUI application in a simulator, click  and select the simulator. For example, select C.



The project log will appear in the **Information** view.

3.2 Open a project

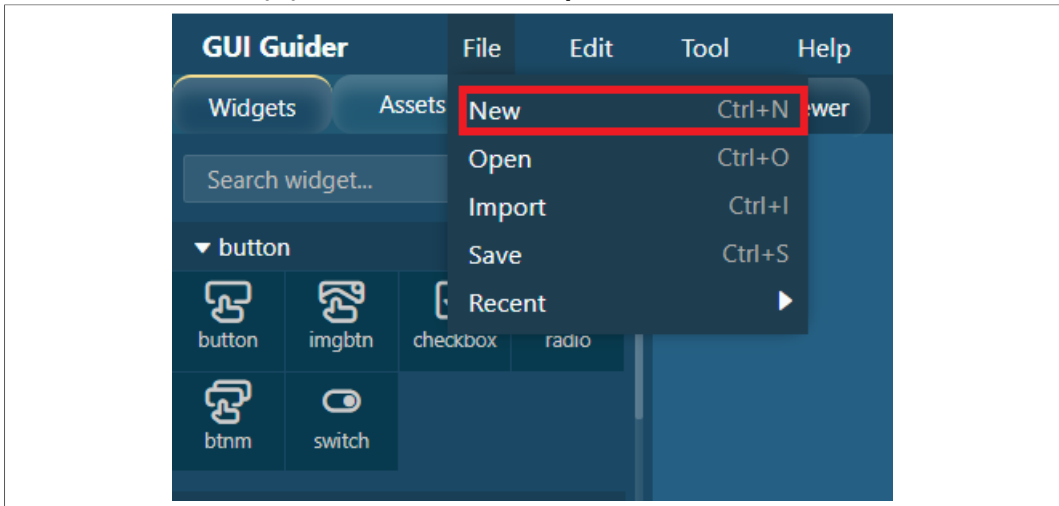
To open a recent project, perform the following steps.

1. Click the **Open a recent project** button.



The **Manage project** dialog box appears with a list of existing projects.

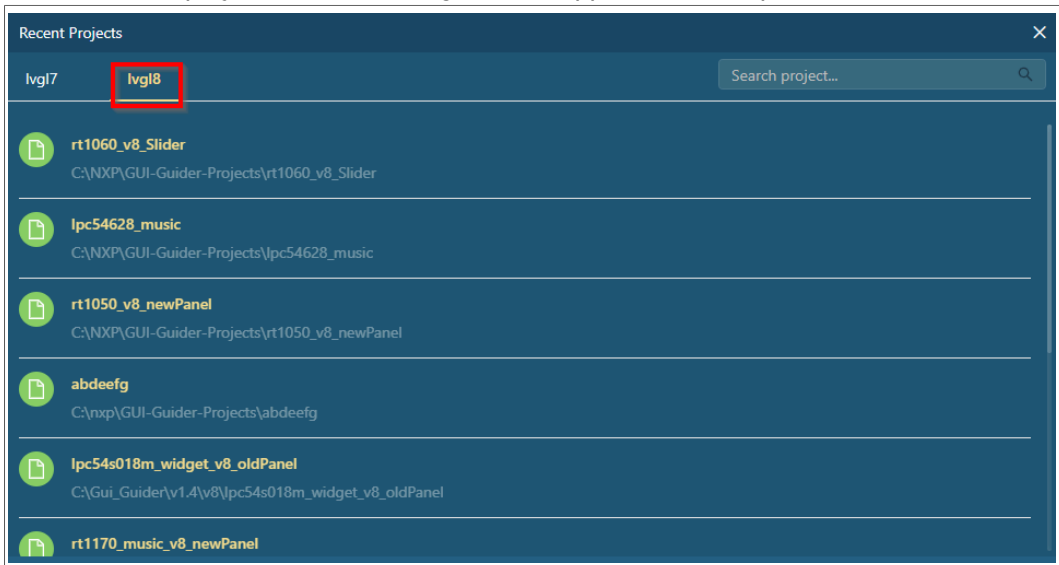
Note: Alternatively, you can select **File > Open** in the GUI editor.



2. Select a project in the list.

The selected project opens in the GUI editor.

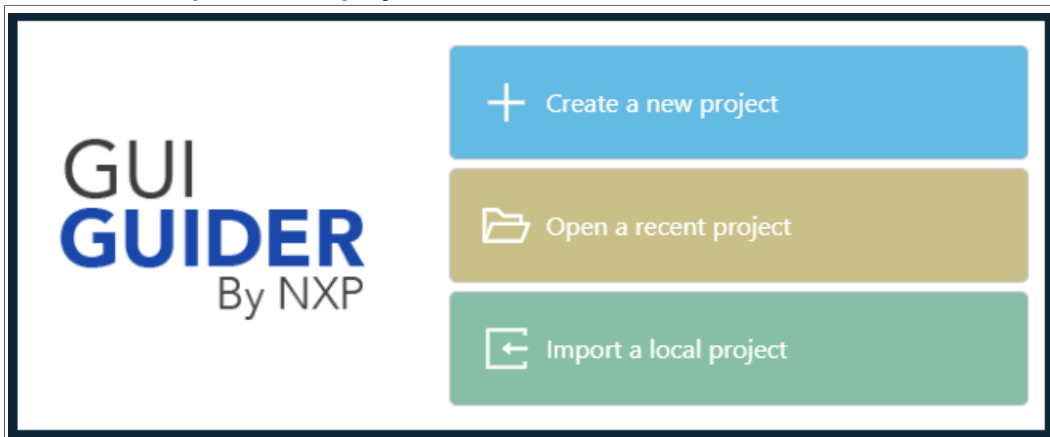
Note: The projects of different *Ivgl* version appear in the respective tabs.



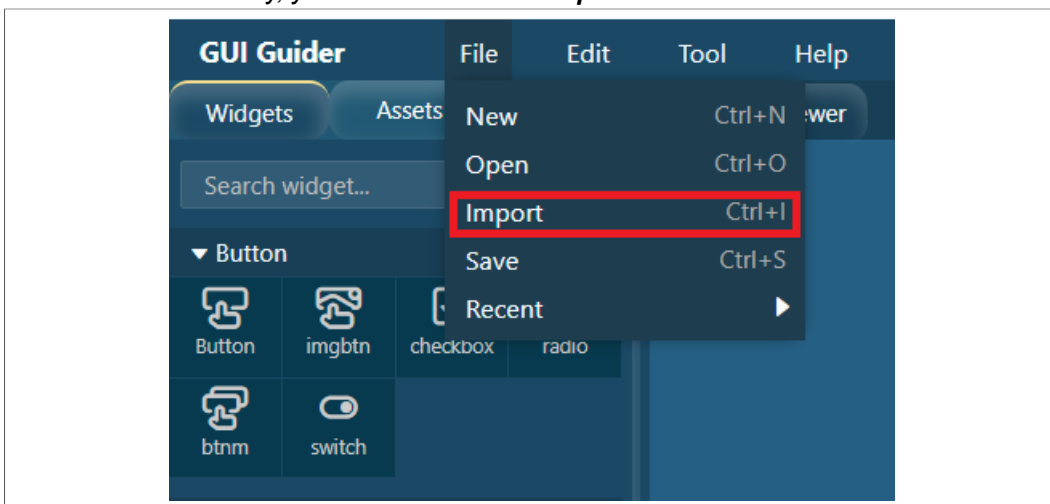
3.3 Import a local project

To import an existing project, perform the following steps.

1. Click the **Import a local project** button.

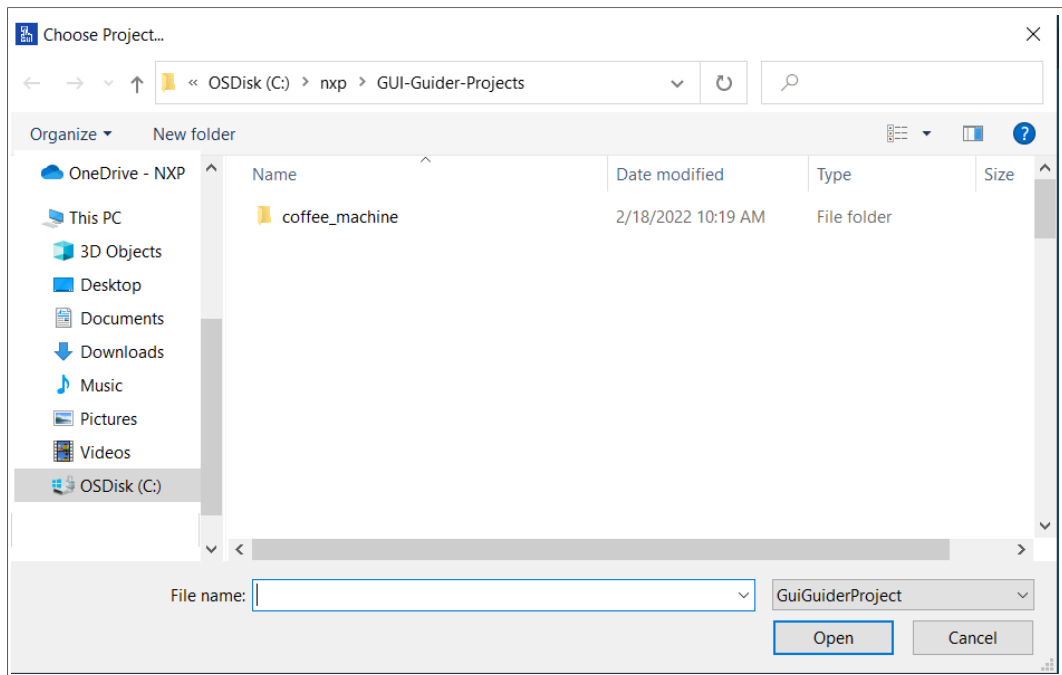


Note: Alternatively, you can select **File > Import** from the GUI editor.

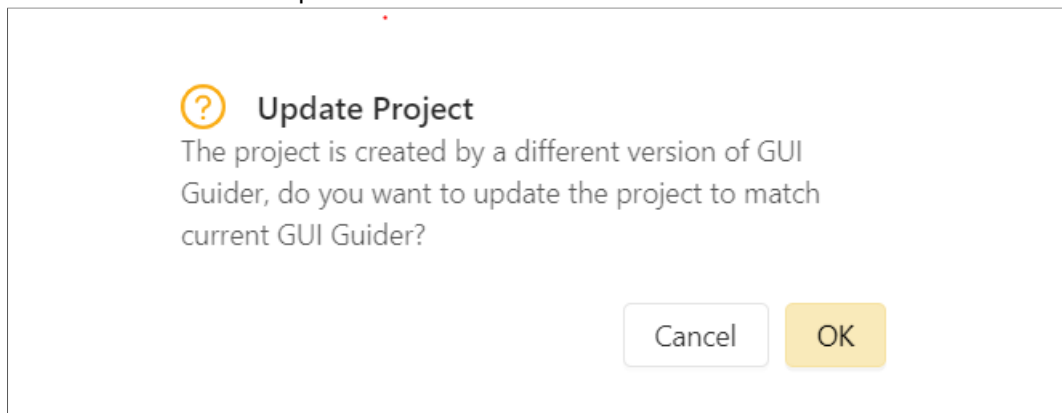


The **Choose Project** dialog box appears.

2. Navigate to the project you want to import from your local directory.
3. Click **Open**.



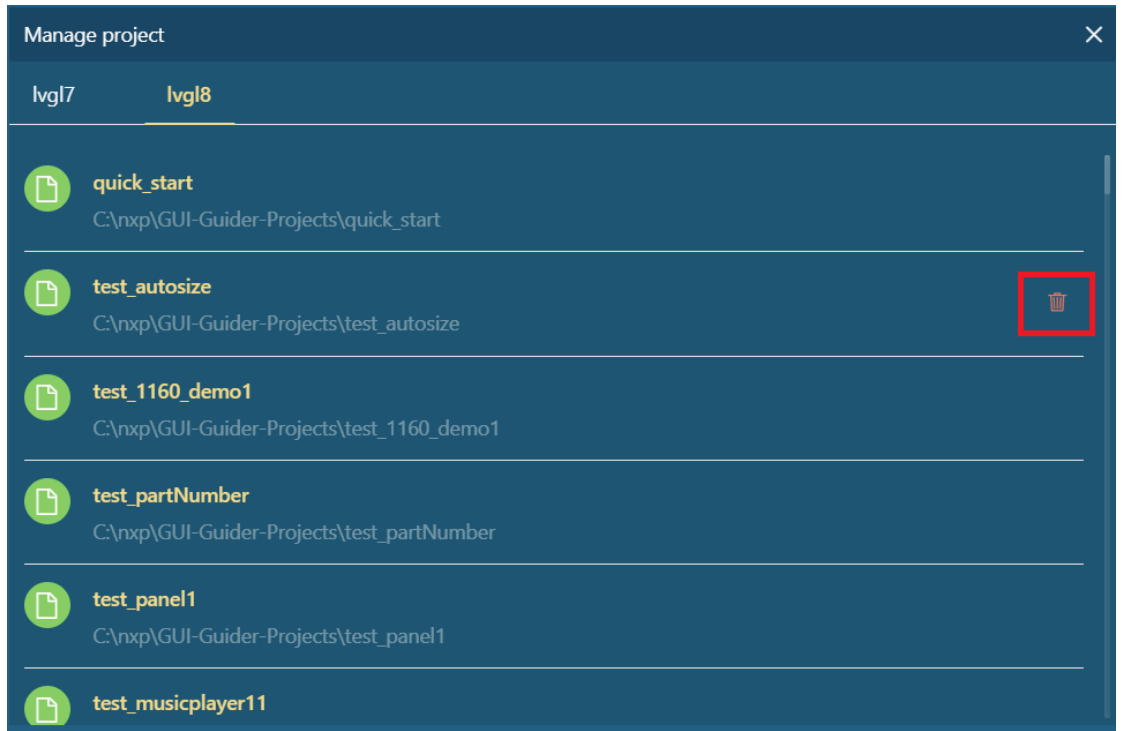
The project is imported in the editor. However, if you try to import an older version of the project, a message prompts whether you want to update the project to match the current GUI Guider. Click **OK** to proceed.




3.4 Delete a project

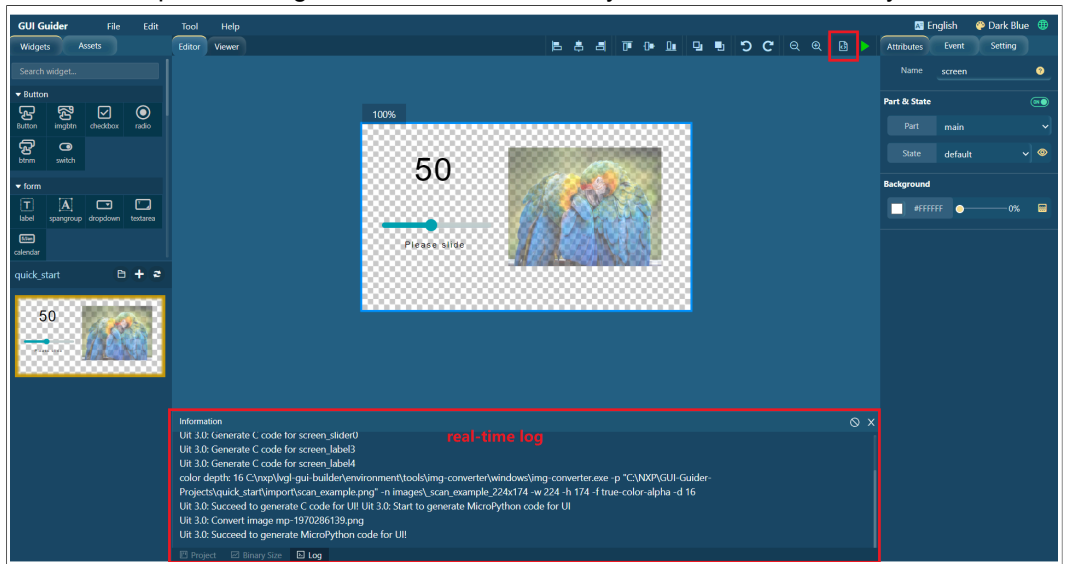
To delete a project, perform the following steps.

1. Exit GUI Guider IDE
2. Delete the project folder from local file system if the project is not needed
3. Open the GUI Guide IDE.
4. Select the **Open a recent project** button.
5. Click the delete icon corresponding to the project you want to delete.



3.5 Generated code

To generate source code of GUI project, click the  icon in the right-upper of edit window. It is possible to generate both the C and Python code automatically.

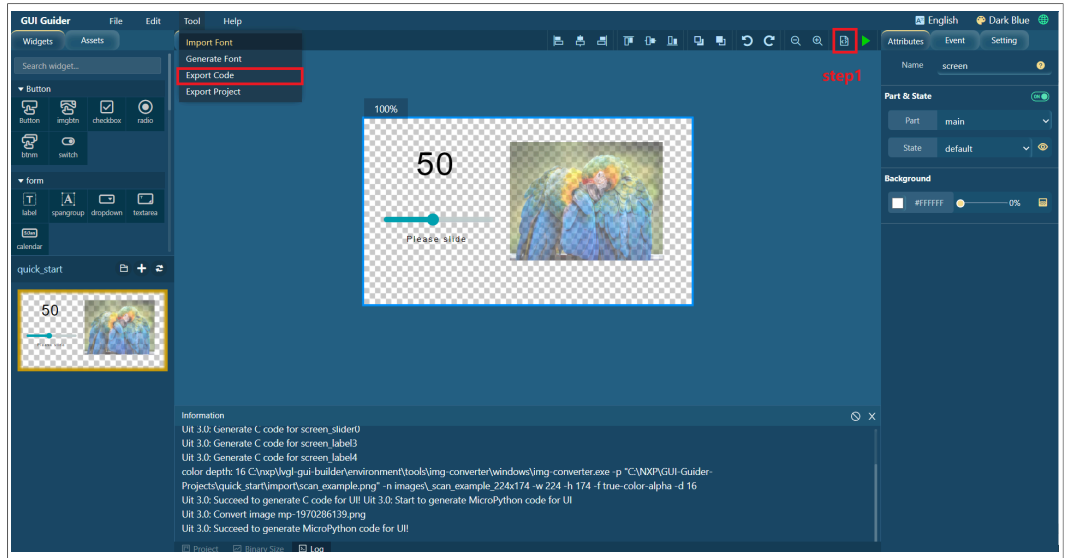


3.6 Export Code

To export the source code to a destination folder, the destination folder should be specified for the first time. The IDE remembers the path for future export.

Note: Before exporting the code, first generate it.

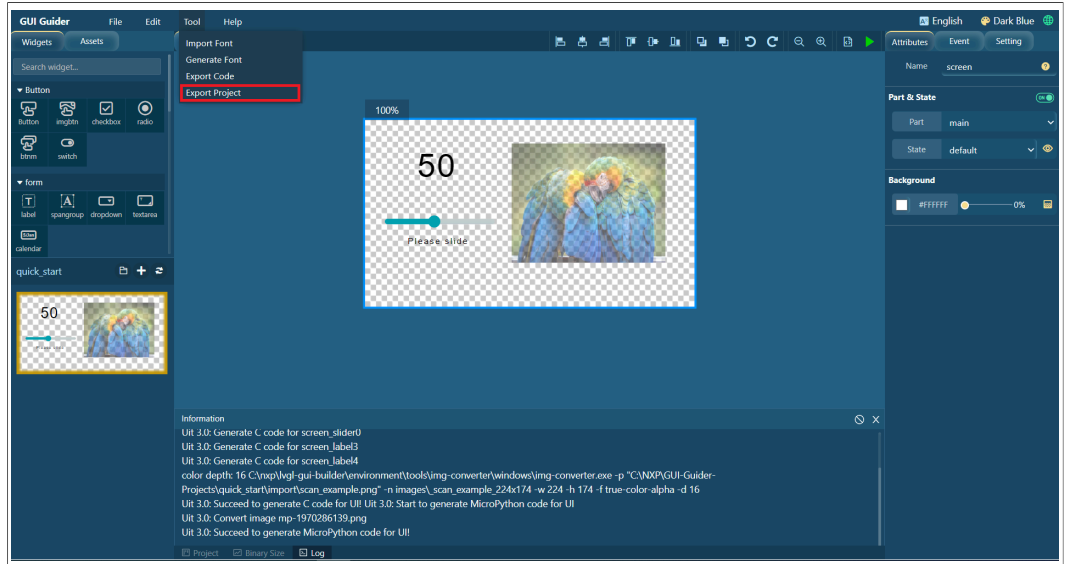
To export the code, click **Tool > Export Code**.



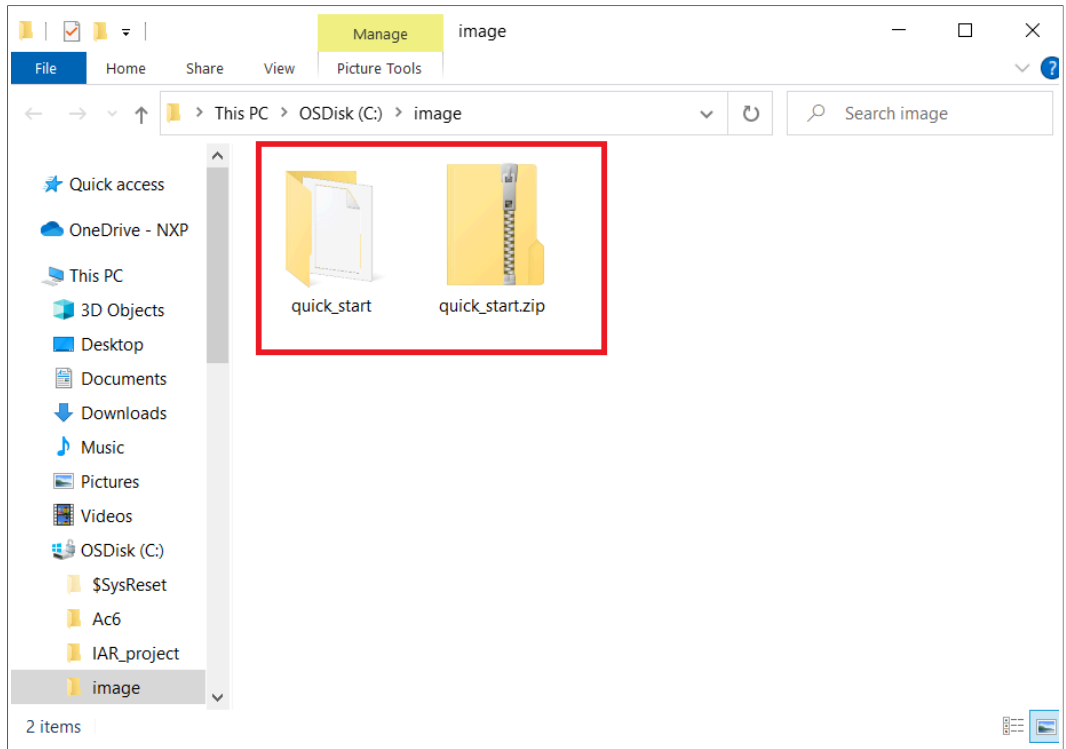
3.7 Export project

To share the GUI Guider project more conveniently, we have added the export project function. The IDE remembers the export path which is a common path in the export code function.

To export the project, click **Tool > Export project**.



The output of the export is the condensed project directory and a compressed file named `projectname.zip`.



3.8 Import fonts

To import fonts, perform the following steps.

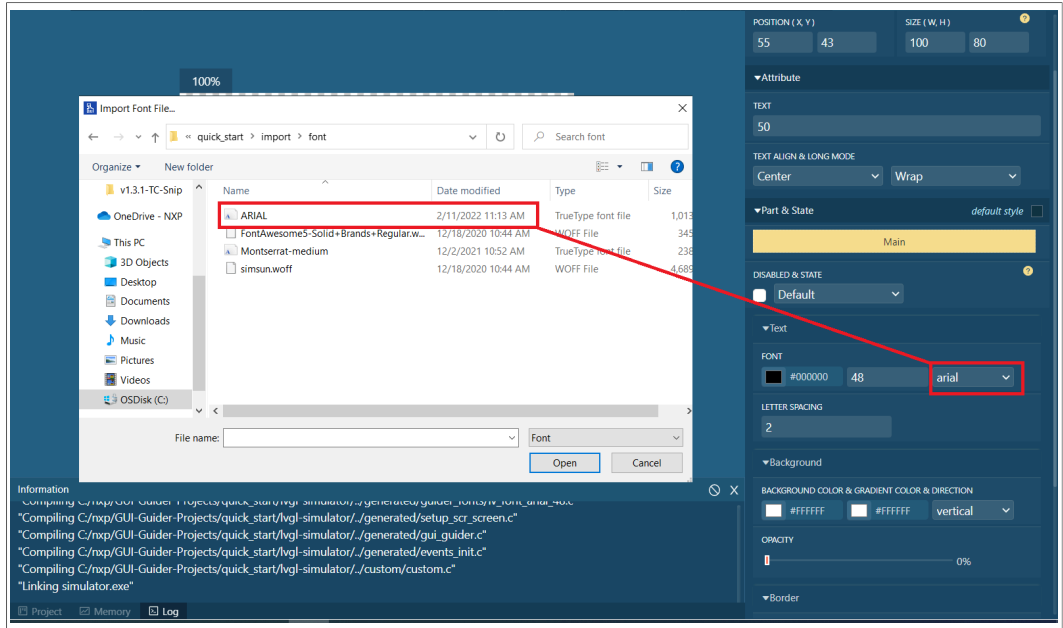
Note: GUI Guider supports TTF and WOFF font type.

1. Select **File > Import Fonts**.
The **Import Font File** dialog box appears.
2. Navigate to the folder where the font that you want to import is located.
3. Select the font.
4. Click **Open**.

Note: The extended fonts are provided at the following location:

- Windows: `#{GG install path}\environment\extended_fonts`
- Linux: `/opt/Gui-Guider/environment/extended_fonts`
- Darwin: `/Applications/Gui-Guider.app/Contents/environment/extended_fonts`

Note: The font imported for the current project is available for all widgets of the project.

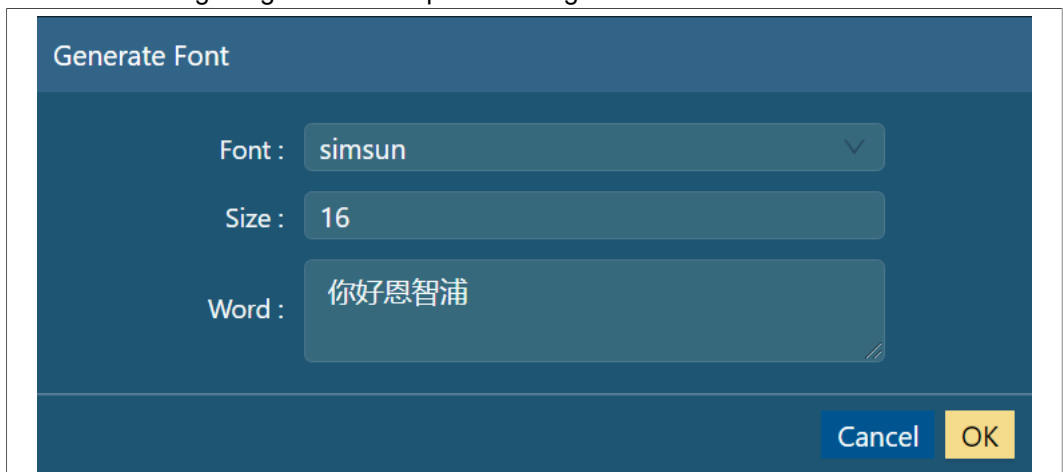


3.9 Generate fonts

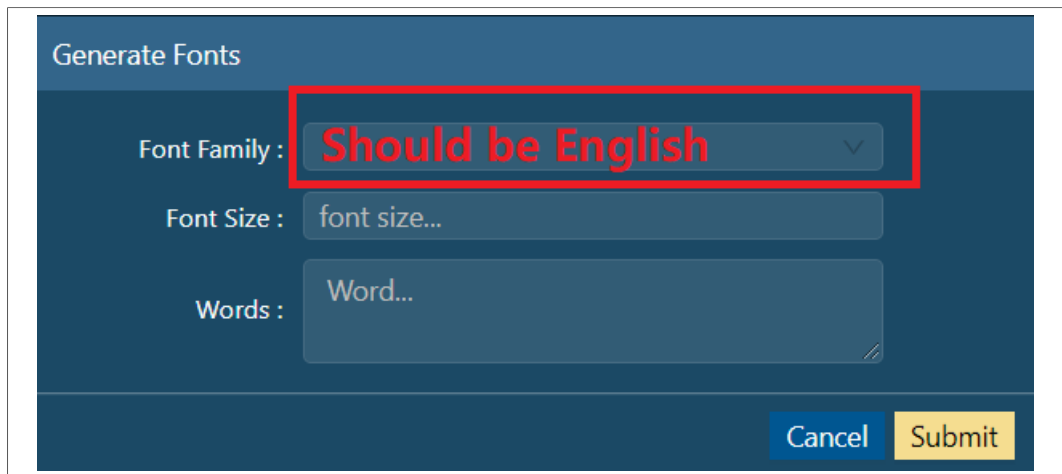
The generated font file is stored in the `<project_name>\generated\guider_customer_fonts` folder. The purpose is to add new characters which otherwise are supported by the selected font type and size. The function is used for non-English languages. For example, Chinese.

To generate fonts:

1. Select **File > Generate Fonts**.
The **Generate Fonts** dialog box appears.
2. Select the font family and size. Ensure that the font family is for the English language. The following image is an example of fonts generated for Chinese.



3. Click **Submit**.
The newly generated font appears normal in the GUI application.



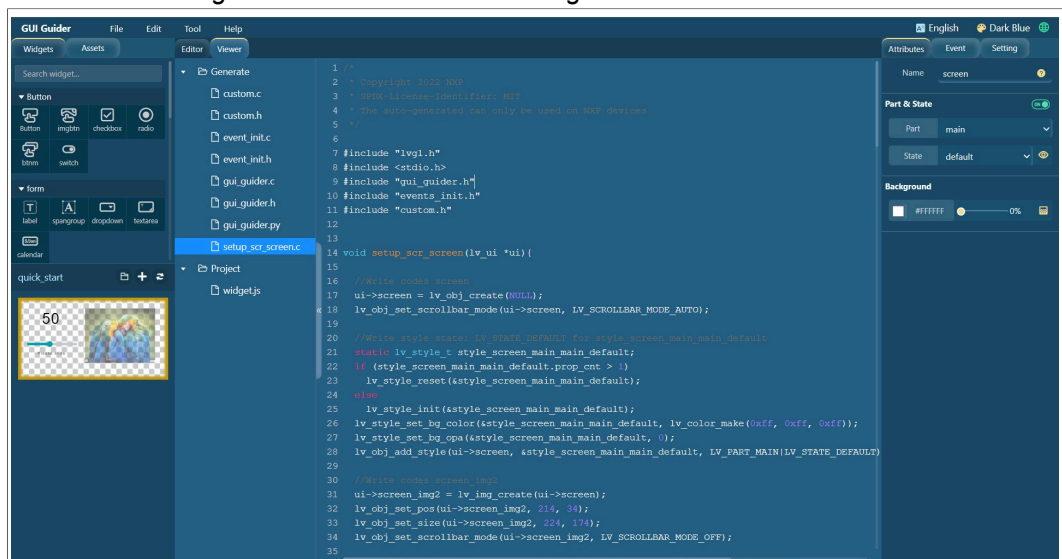
The function provides an API to convert fonts to a C array. The C array file is generated in the generated\guider_customer_fonts folder. The following is the example code of using the generated font.

```
#include "lv_font.h"
LV_FONT_DECLARE(lv_font_simsun_12)
lv_style_set_text_font(&style_screen_ddlist1_selected,
LV_STATE_DEFAULT, &lv_font_simsun_12);
```


3.10 Code view

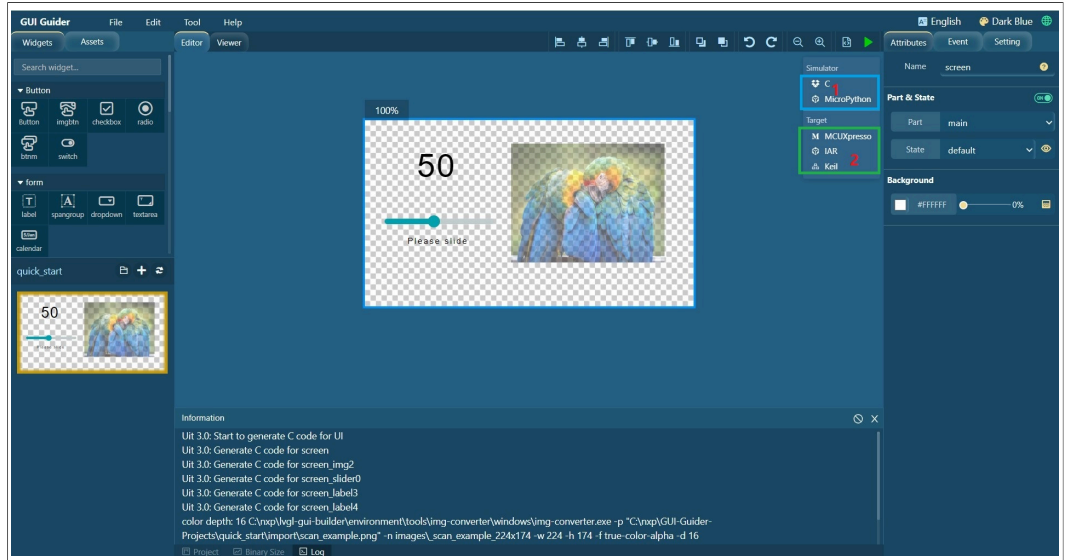
The source code generated by GUI Guider appears in the **Code Viewer** tab. The navigator is on the left side of the code viewer and switches to the source file that you want to view.

Note: Ensure to generate the code before using the code viewer.



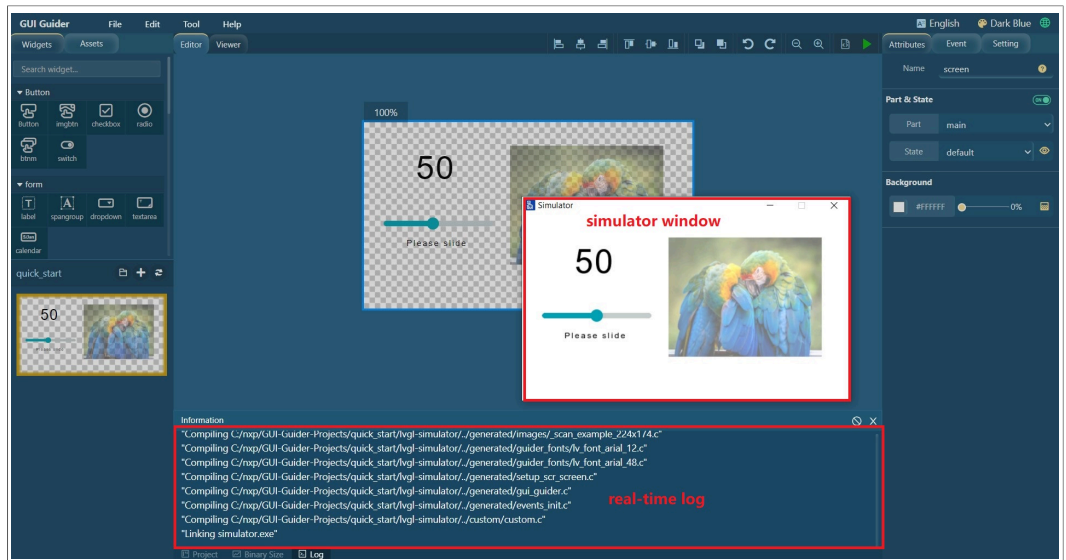
3.11 Run simulator

Both the C simulator and the MicroPython simulator are supported. To select a simulator and run it in the GUI application, click the  icon.



The simulator opens in a separate window.

Note: When the simulator is launched, the **Generate Code**, **Run Simulator**, and **Run Target** options are disabled until the simulator window is closed. You can use the mouse or the keyboard to interact with the GUI elements in the simulator.



Note: The GUI Guider main window changes to modal state when **Run simulator** is clicked. MicroPython is not supported for lvgl v7.

3.12 Run target

GUI Guider supports one-key build and deploy image on target board. GUI Guider also supports three toolchains: MCUXpresso, IAR, and Keil. Ensure that the corresponding

IDE is installed on your host machine. [Table 1](#) provides information on the supported toolchain.

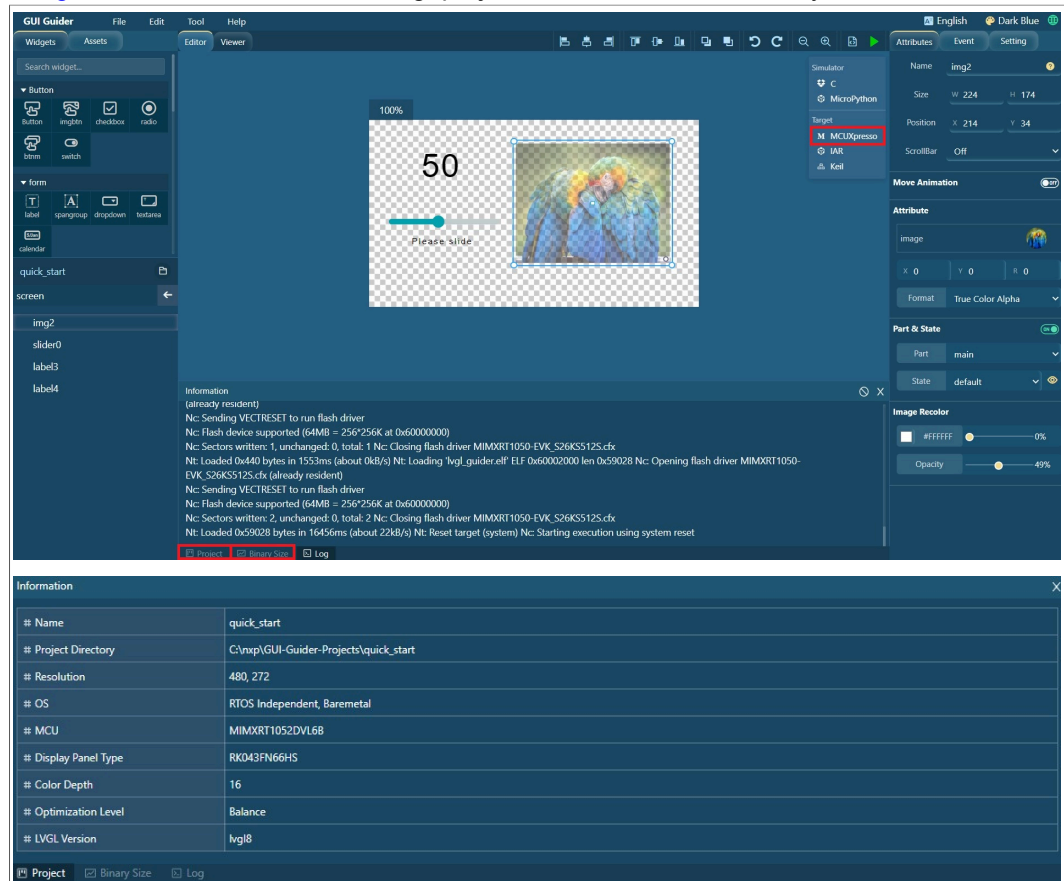
Table 1. Supported toolchain

Toolchain	Version	Support OS	Connector
IAR	9.30.1	Win10	USB
MCUXpresso IDE	11.6.0	Win10, OSX11, and Ubuntu 20.04	USB
Keil MDK	5.37	Win10	USB

The following prerequisites must be met to run the target successfully:

- Boards with CMSIS-DAP/mebed/DAPLink interface.
- For LPCXpresso boards, install the DFU jumper for the debug probe.
- Connect the development platform to your PC via USB cable.

[Figure 1](#) shows the window of log, project information, and memory monitor.



Information		
text	366024	shows the code and read-only data in your application (in decimal)
data	160	shows the read-write data in your application (in decimal)
bss	3023120	shows the zero initialized ('bass and 'common') data in your application
dec	3389304	total of 'text' + 'data' + 'bss' (in decimal)
hex	33b778	hexadecimal equivalent of 'dec'
filename	lvgl_guider.elf	

Figure 1. Project log, information, and memory monitor

Typically:

- The flash consumed by the GUI application is text + data
- The RAM consumed by the application is data + bss.

Note:

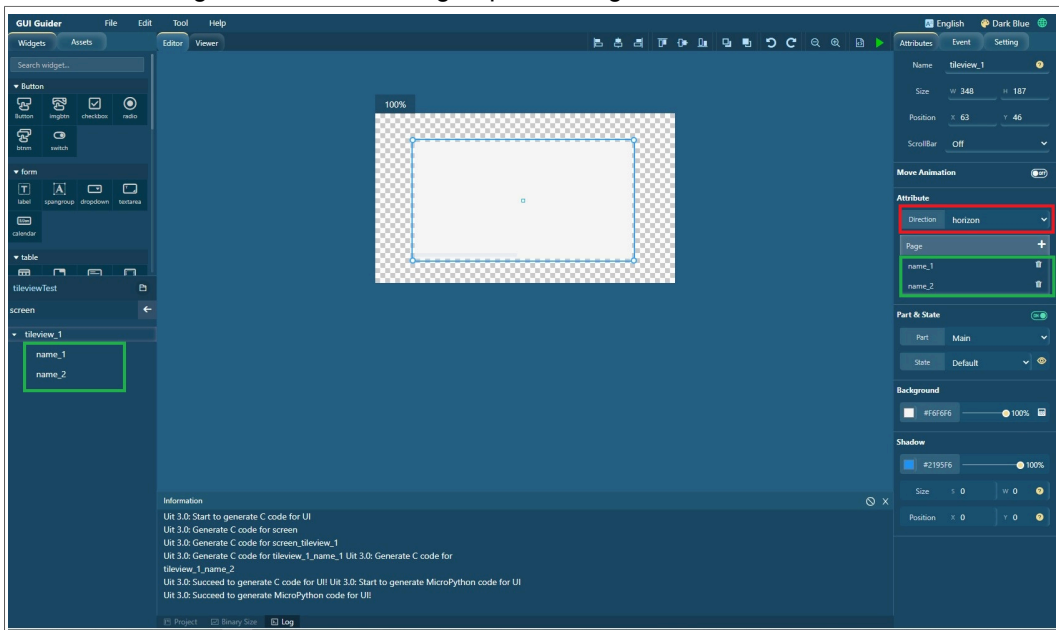
- Only MCUXpresso IDE supports memory display.
- The project does not support “Run Target” when simulator is selected as board template

3.13 Tileview usage

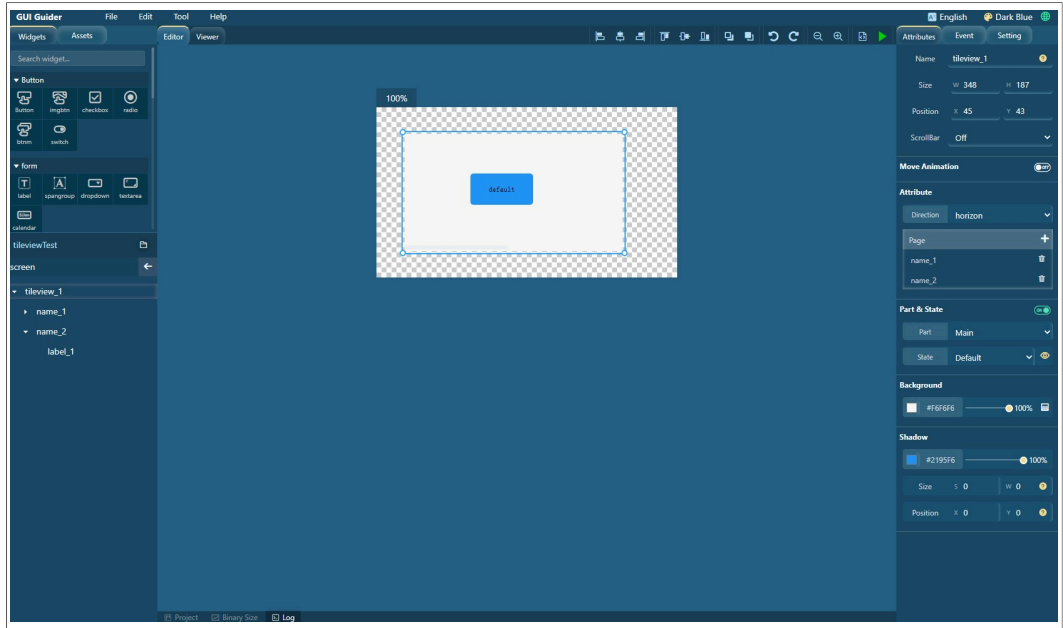
Tileview is implemented as a standard widget in GUI Guider. You can design the GUI in tileview by drag-and-drop operation.

To use the **tileview** widget, perform the following steps.

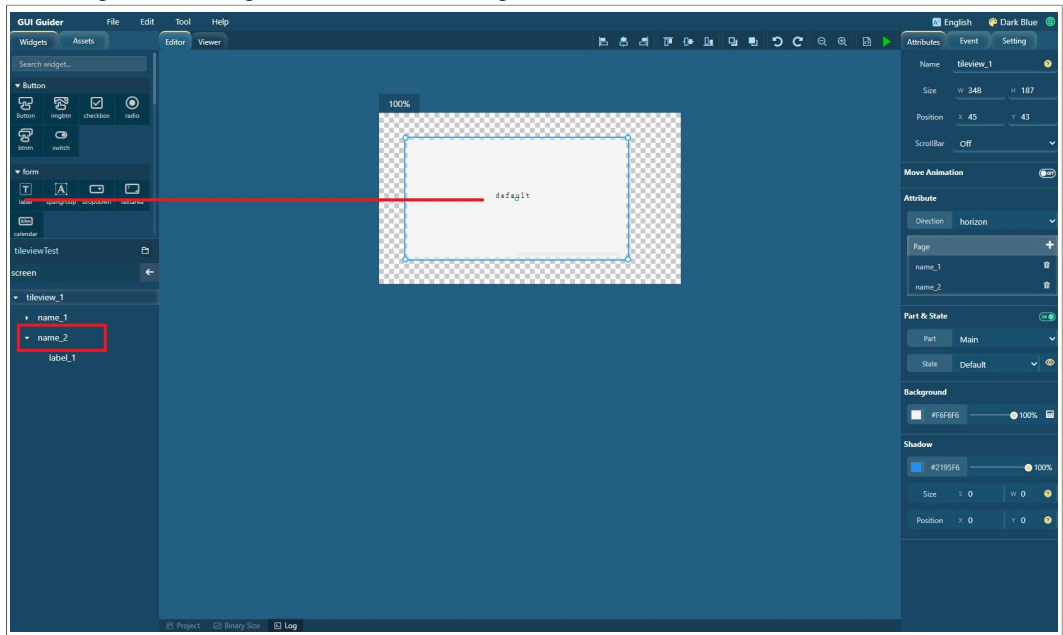
1. Drag the tileview widget to the editor.
 - Note:** If you are unable to find the widget, type the name of the widget in the search field and press Enter. The widget name appears in the search results.
2. To add a Page in the **Attributes** group on the right, click the + icon.



3. Select the **name_1** tab.
4. Drag a button widget to the **tileview** widget.



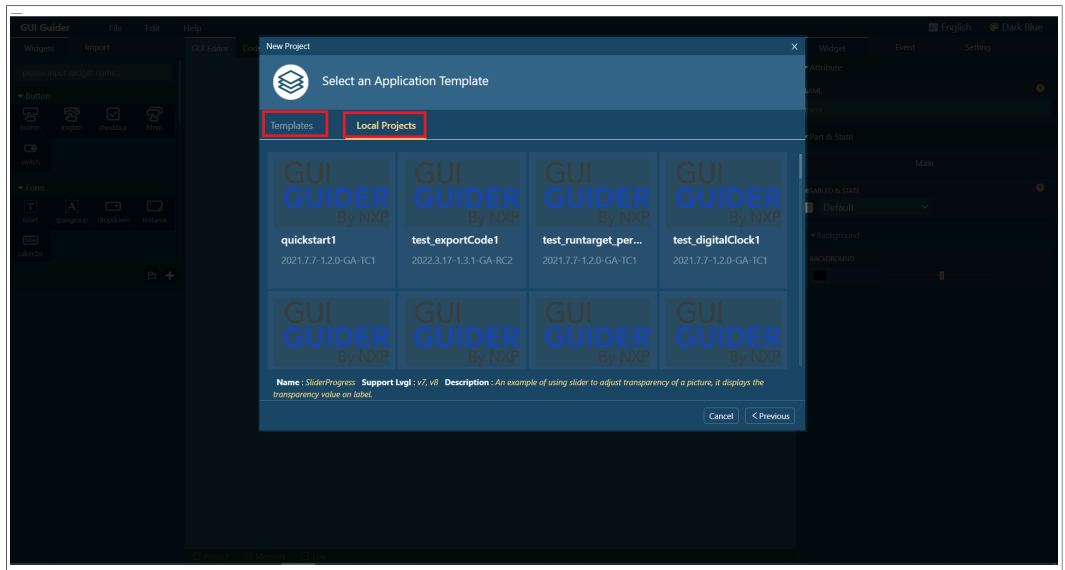
5. Select the **name_2** tab.
6. Drag an **arc** widget to the tileview widget.



3.14 GUI auto-scaling

The auto-scaling function in the GUI Guider application, resizes the GUI to adapt the display of a different size. The auto-scaling function is useful when you want to reuse an application designed based on a particular display size. The function can support new project based on application template and local project.

Note: *If there is a hard-coded size in the custom code, the position and the size-related code must be adjusted manually in the custom code.*



3.15 Event window

[Table 2](#) lists the options in the **Events** window.

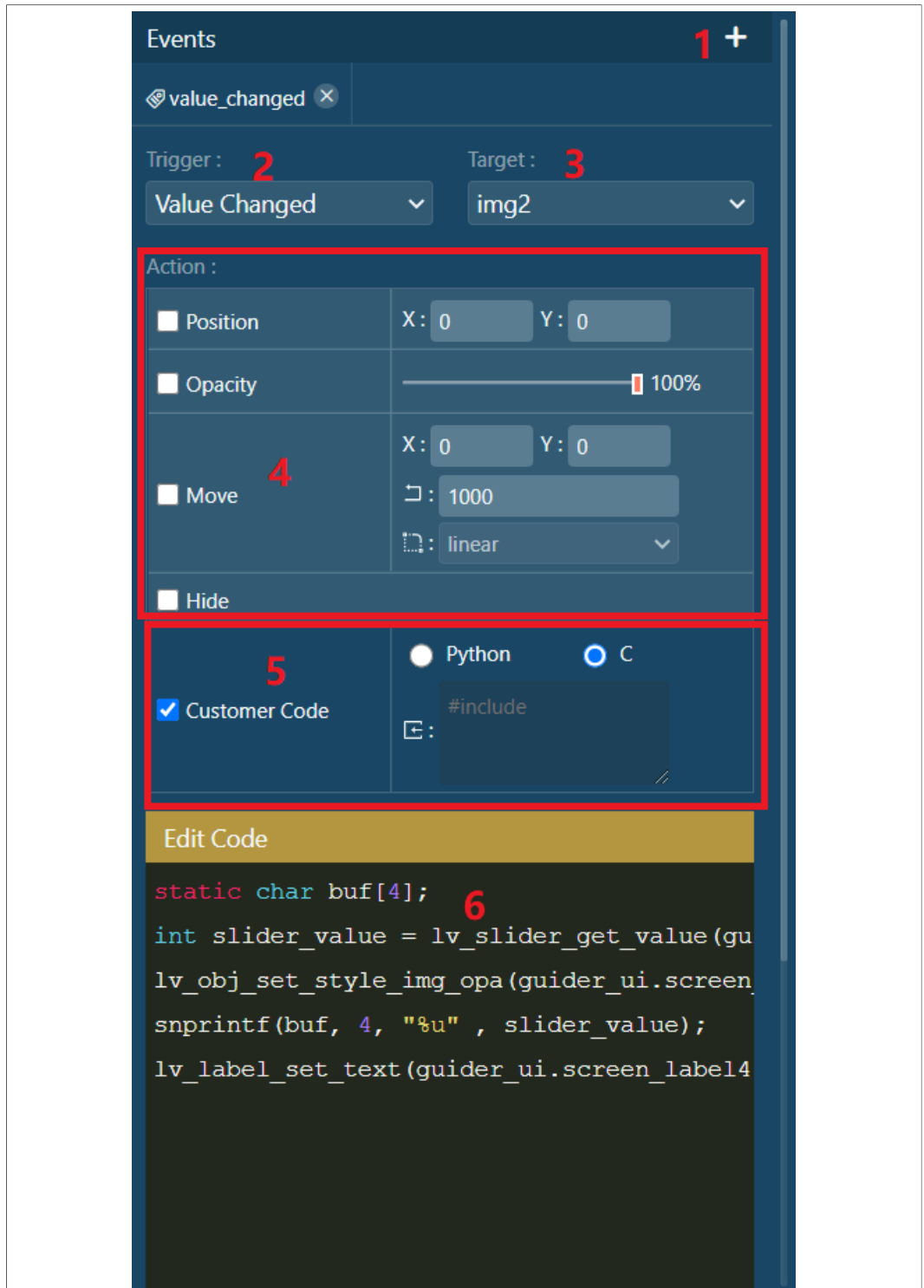


Table 2. Events window

Label	Description
1	Add event of this widget.
2	Select trigger.

Table 2. Events window...continued

Label	Description
3	Target widget (widget to be acted upon).
4	Select action (support choose multiple).
5	Select custom code function.
6	Edit your custom code.

3.16 Resource window

[Table 3](#) lists the options in the **Resource** window.

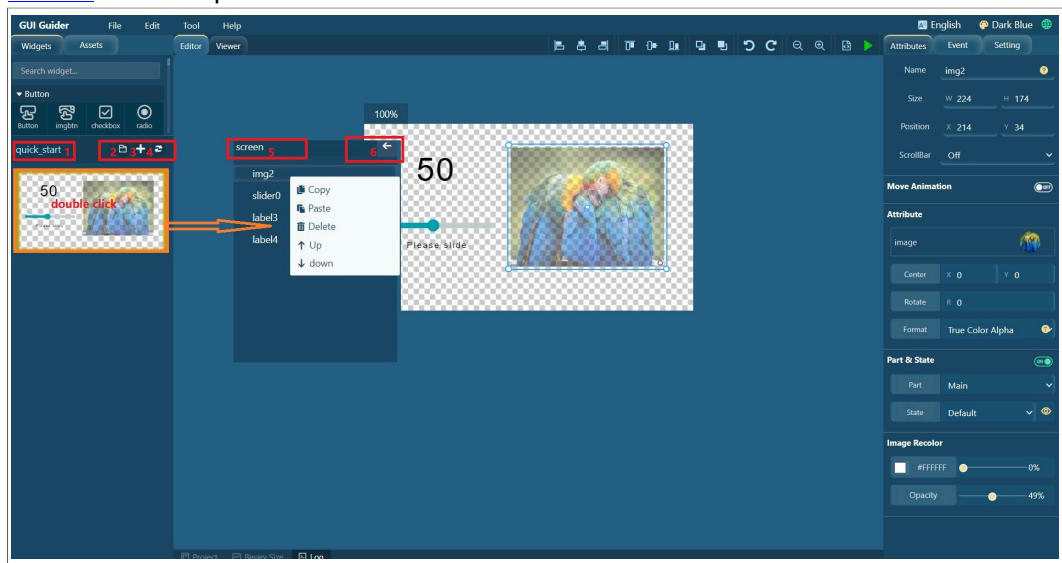


Table 3. Resource window

Label	Description
1	The name of current project.
2	Open the project folder with File Explorer.
3	Add a new screen.
4	To refresh the current screen.
5	The name of current screen.
6	Back to preview mode.

3.17 Import resource

[Table 4](#) lists the options in the **Import** resource window.

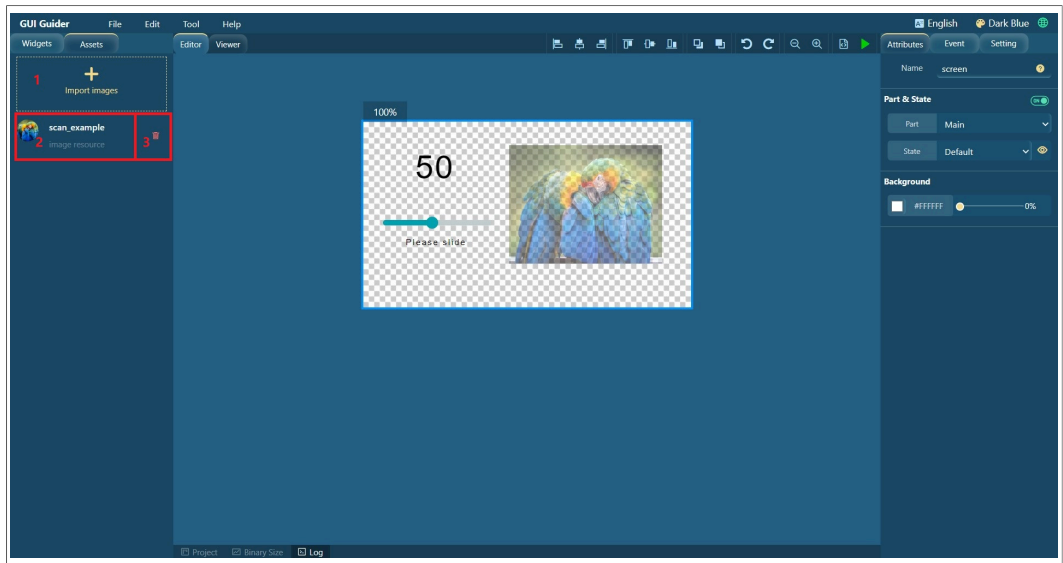


Table 4. Import resource

Label	Description
1	Import image button.
2	Imported images of current GUI APP.
3	Delete button.

3.18 Shortcut function

[Table 5](#) lists the shortcut functions.

Edit	Tool	Help
Copy		Ctrl+C
Paste		Ctrl+V
Delete		Del
Undo		Ctrl+Z
Redo		Ctrl+Y

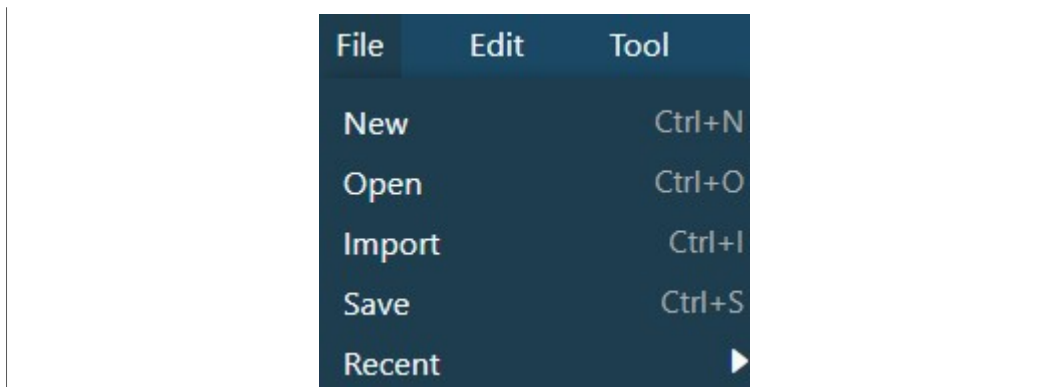


Table 5. Shortcut functions

Function Name	Shortcut
New project	Ctrl + N
Open project	Ctrl + O
Import project	Ctrl + I
Save	Ctrl + S
Copy	Ctrl + C
Paste	Ctrl + V
Delete	Del
Undo	Ctrl + Z
Redo	Ctrl + Y

3.19 Project setting

[Table 6](#) lists the options in the **Project setting** window.

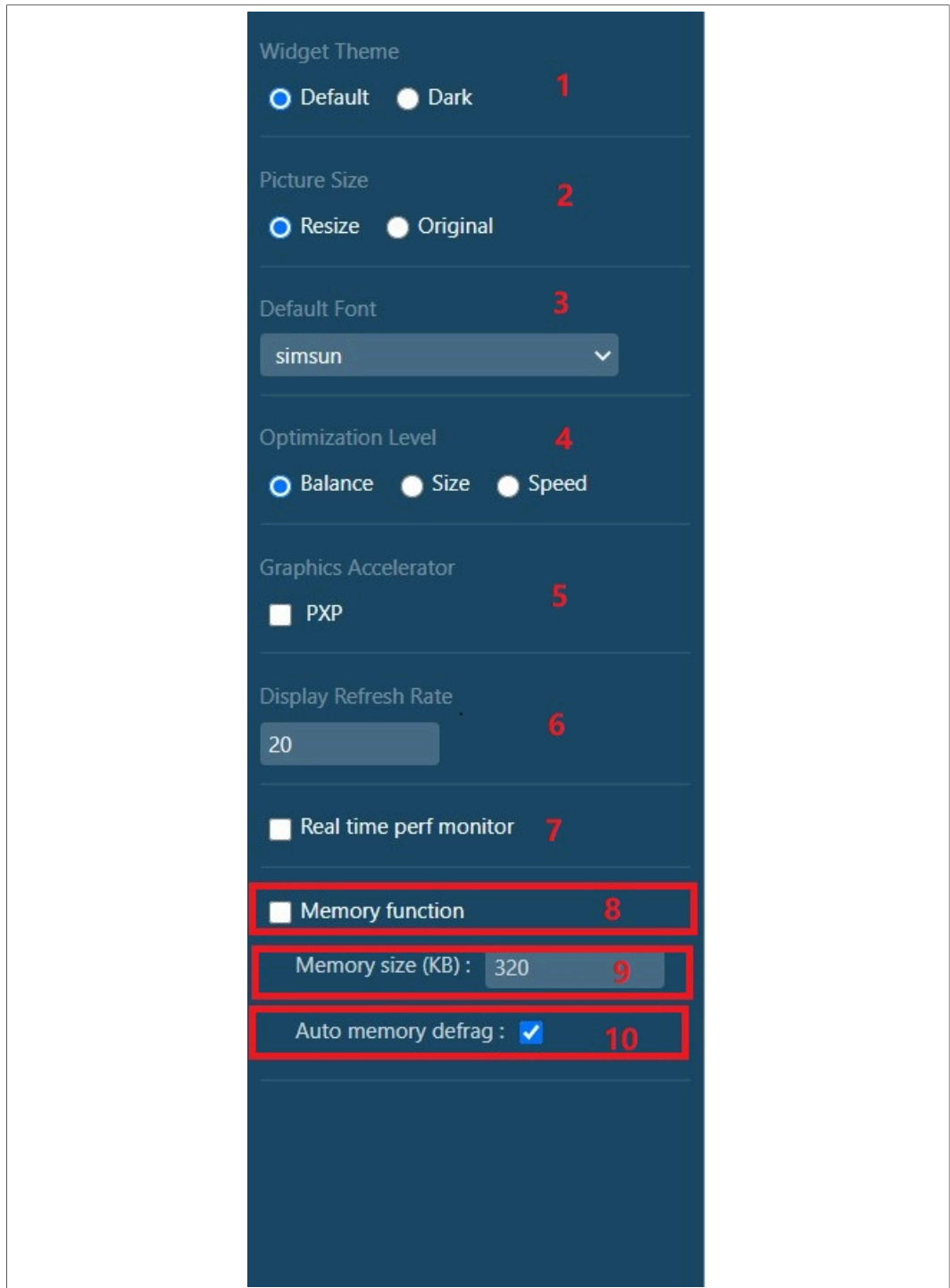


Table 6. Project setting window

Label	Description
1	Select widget theme.
2	Set the image widget default size.
3	Set the default font.

Table 6. Project setting window...continued

Label	Description
4	Select optimization level (Only support NXP target).
5	Enable PXP or VGLITE.
6	Set the default display refresh period.
7	Enable the real-time performance monitoring.
8	Use the custom memory configuration.
9	Set the size of memory allocated for LVGL application usage when using a custom memory configuration.
10	Enable the automatic memory fragments cleanup.

3.20 IDE setting

[Table 7](#) lists the options in the **IDE setting** window.

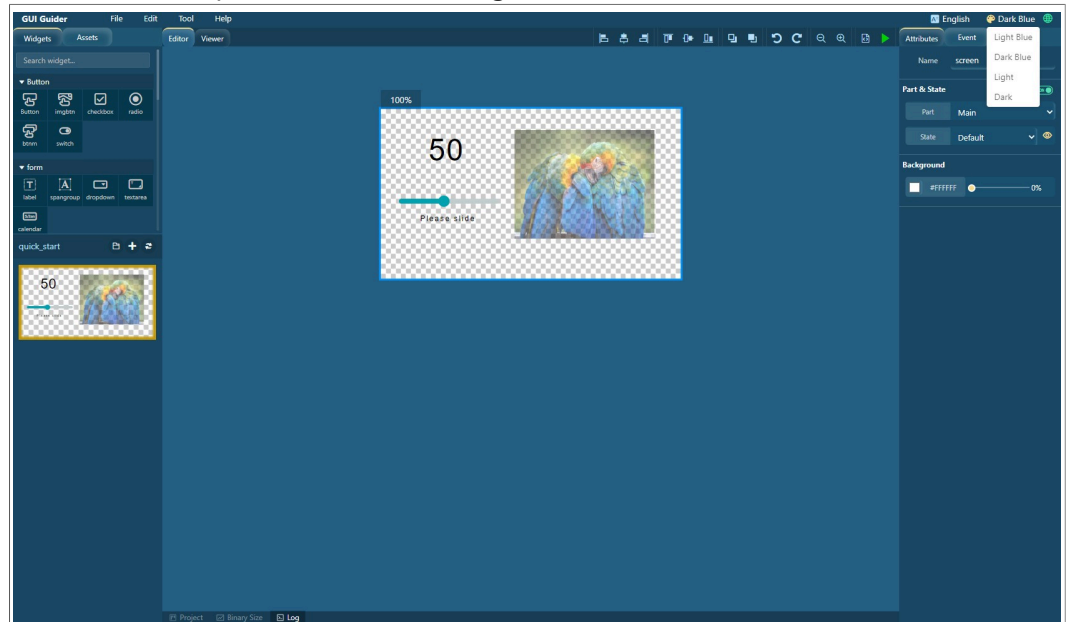


Table 7. IDE setting window

Item Name	Option
Language	English and Chinese
Theme	Light Blue, Dark Blue, Light, and Dark

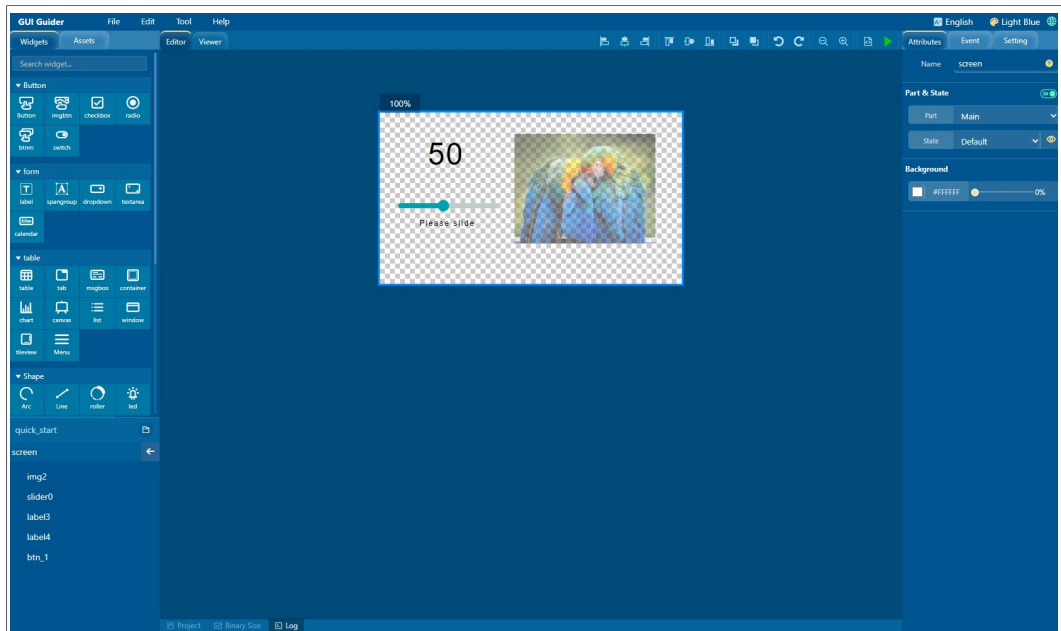


Figure 2. Light blue theme

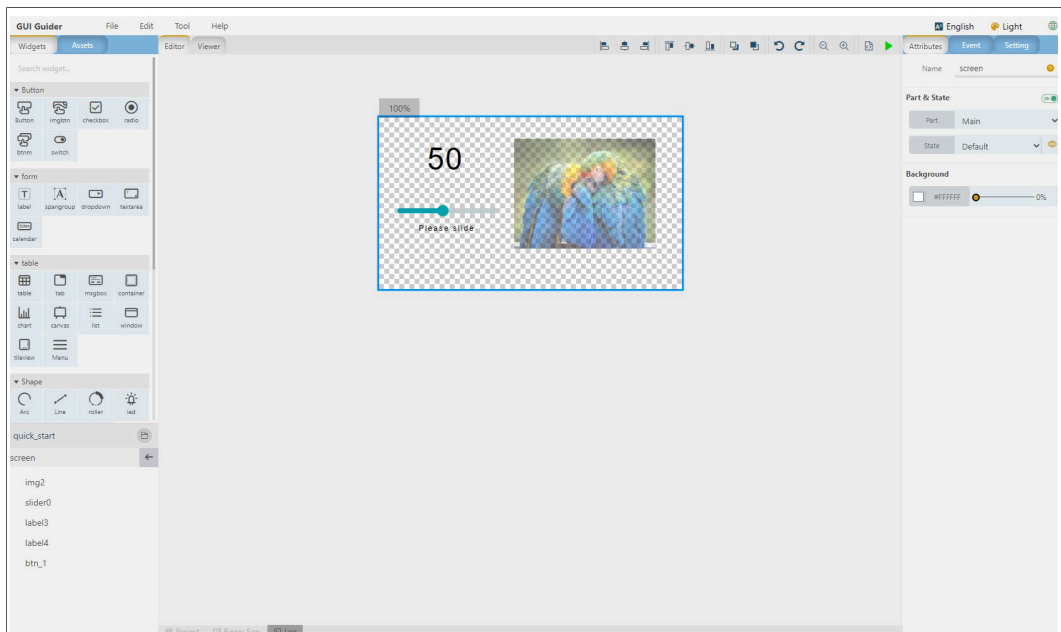


Figure 3. Light theme

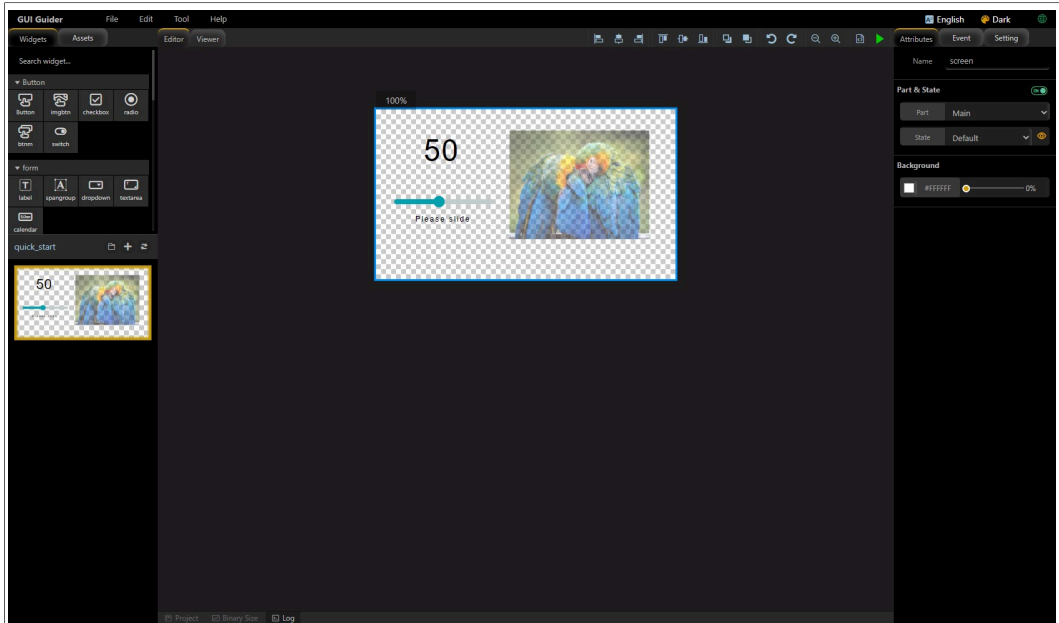


Figure 4. Dark theme

4 Widget details

This section describes the GUI Guider widgets. The following are the common properties in all the widgets.

Table 8. Common properties

Property	v7	v8	Description
Name	General Setting > Name	General Setting > Name	Default name: Generated by the widget type and id. Must begin with a letter. Must be at least three characters long. Can only include letter, number, and underscore.
Position (x,y)	General Setting > Position	General Setting > Position	Position of widget, including x and y coordinate. x should be a value between 0 and width of screen. y should be a value between 0 and height of screen.
Size (W,H)	General Setting > Size	General Setting > Size	Size of widget. Set the width and height of the widget.
Scrollbar		General Setting > Scrollbar	The scrollbar option for widgets: OFF, ON, ACTIVE, AUTO.

Table 8. Common properties...continued

Property	v7	v8	Description
Shadow color		General Setting > Shadow color	Set the shadow color.
Shadow opacity		General Setting > Shadow opacity	Set the shadow opacity.
Shadow spread		General Setting > Shadow spread	Make the shadow calculation to use a larger or smaller rectangle as base.
Shadow width		General Setting > Shadow width	Set the width of the shadow in pixels.
Shadow position (x, y)		General Setting > Shadow position	Set an offset on the shadow in pixels

4.1 3Dimg

3D animation widget can rotate a given image along with X-axis, Y-axis, Z-axis, or combined.



Figure 5. 3D animation widget in v7



Figure 6. 3D animation widget in v8

Table 9. 3Dimg properties

Property	v7	v8	Description
Image Path	Attribute > Image Path	Attribute > Image Path	Add the image files.
Interval	Attribute > Interval	Attribute > Interval	Time between two frames.
Repeat Count	Attribute > Repeat Count	Attribute > Repeat Count	Animation repeat time.

Table 9. 3Dimg properties...continued

Property	v7	v8	Description
Axis x, y, z	Attribute > Axis	Attribute > Axis	Rotation matrix over X,Y,Z Axis is between 0 and 360. X is the animation image horizontal rotation degree, Y is the animation image Vertical rotation degree, Z is the animation image Lateral rotation degree.
Frame number	Attribute > Frame number	Attribute > Frame number	The number of pictures converted and the value must be between 0 and 360.

4.2 Analog clock

The following are the details of the analog clock widget.

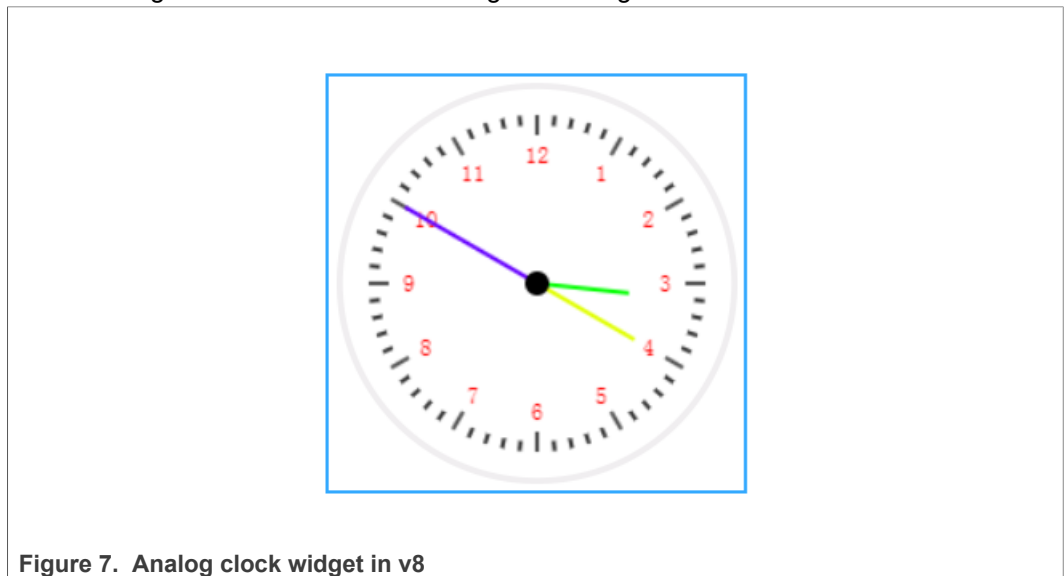


Figure 7. Analog clock widget in v8

Table 10. Analog clock properties

Property	v7	v8	Description
gap		Attribute > gap	
Hour Tick width & Length, color		Attribute > Hour Tick width & Length, color	Tick width is less than 10, Tick length is less than 20.
Minutes Tick width & Length, color		Attribute > Minutes Tick width & Length, color	Tick width is less than 10, Tick length is less than 20.
Hour, Minute, Second		Attribute > Hour, Minute, Second	
NeedleType & Value		Attribute > NeedleType & Value	
Needle width & length & Color		Attribute > Needle width & length & Color	Needle width is less than 10, Needle length is less than 20.

Table 10. Analog clock properties...continued

Property	v7	v8	Description
Image path		Attribute > Image Path	
X & Y, W & H		Attribute > X & Y, W & H	Needle width is less than 10, Needle length is less than 20.
State		Part and State > Main > State	
Disable		Part and State > Main > Disable	
Background color		Part and State > Main > Background color	
Opacity		Part and State > Main > Opacity	max: 255.
Background gradient direction		Part and State > Main > Background gradient direction	
State		Part and State > Digit > State	
Disable		Part and State > Digit > Disable	
Font color		Part and State > Digit > Font color	
Font size, font family		Part and State > Digit > Font size, font family	

4.3 Animation image

The animation image widget supports to produce animation based on the image series or the GIF image.



Figure 8. Animation image in v7



Table 11. Animation image properties

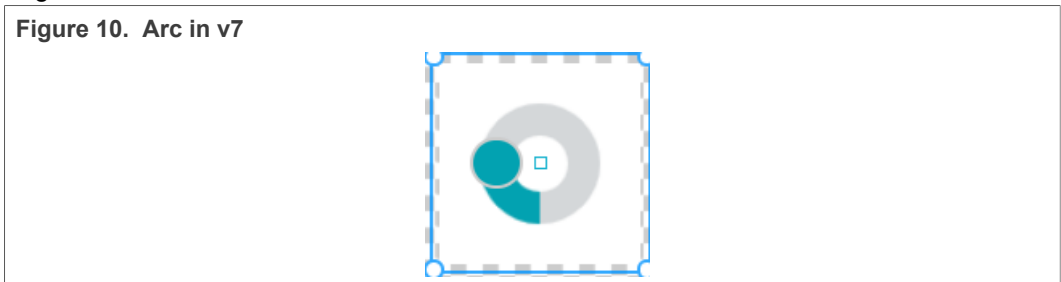
Property	v7	v8	Description
Interval	Attribute > Interval	Attribute > Interval	Time between two frames.
Repeat Count	Attribute > Repeat Count	Attribute > Repeat Count	Animation repeat time.
Start callback function	Attribute > Start callback function	Attribute > Start callback function	Set the playback-customized start callback function.
Ready callback function	Attribute > Ready callback function	Attribute > Ready callback function	Set the playback-customized ready callback function.
Image Path	Attribute > Image Path	Attribute > Image Path	Add the image files.

Note: The callback function name must begin with a letter or an underscore, must be at least three characters long, can only include letter, number, and underscore.

Note: Limitation: The animation image does not support *lpc54628* and *lpc54s018*.

4.4 Arc

The arc consists of a background and a foreground arc. Both can have start and end angles and thickness.



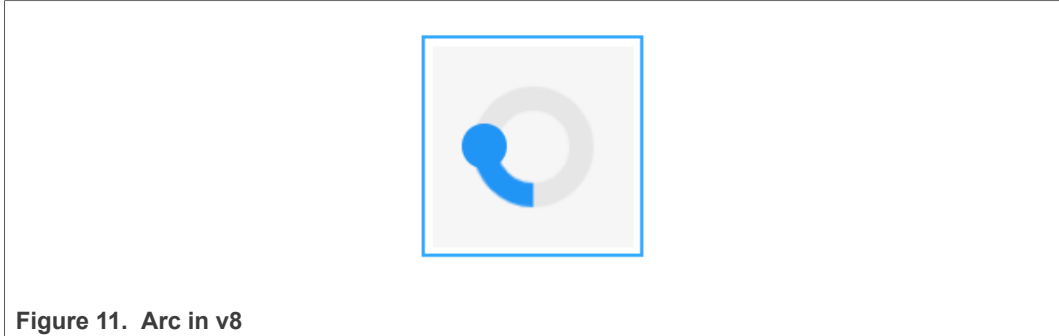


Figure 11. Arc in v8

Table 12. Arc properties

Property	v7	v8	Description
Model	Attribute > Model	Attribute > Model	Normal, symmetrical, reverse
Value	Attribute > Value	Attribute > Value	Start value and end value
Angle	Attribute > Angle	Attribute > Angle	Set the arc indicator start and end angle.
Background angle	Attribute > Background angle	Attribute > Background angle	Set the arc Indicator background start and end angle.
rotate	Attribute > rotate	Attribute > rotate	
Line cap	Attribute > Line cap	Attribute > Line cap	Set the style of Line cap, butt, or round.
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings is invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of main part. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity of main part. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color in main part, vertical or horizontal.
Line color	Part and State > Main > Line color	Part and State > Main > Line color	Line color. It can be set by color picker or input RGB value.
Padding left, right, top, bottom	Part and State > Main > Padding left, right, top, bottom	Part and State > Main > Padding left, right, top, bottom	Padding for the width. The value should be between 1 and 20.
Line width	Part and State > Main > Line width	Part and State > Main > Line width	Line width. The values should be between 0 and 20.
state	Part and State > Indicator > state	Part and State > Indicator > state	Style of Indicator part. It can be defined by one state or more states.

Table 12. Arc properties...continued

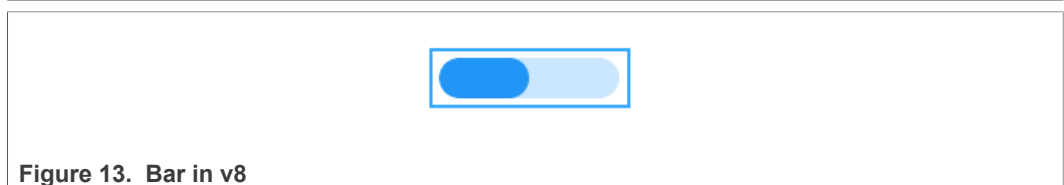
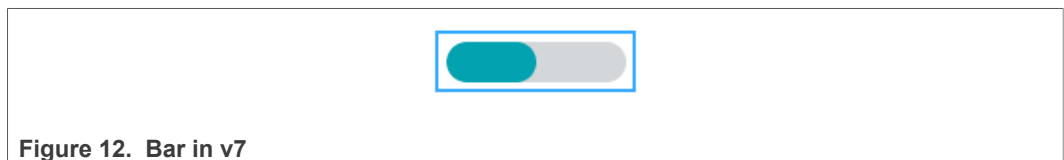
Property	v7	v8	Description
Disable	Part and State > Indicator > Disable	Part and State > Indicator > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Line color	Part and State > Indicator > Line color	Part and State > Indicator > Line color	Indicator Line color. It can be set by color picker or input RGB value.
Line width	Part and State > Indicator > Line width	Part and State > Indicator > line width	Indicator Line width. The values should be between 0 and 20.
state	Part and State > Knob > state	Part and State > Knob > state	Style of knob part. It can be defined by one state or more states.
Disable	Part and State > Knob > Disable	Part and State > Knob > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Knob padding	Part and State > Knob > Line color	Part and State > Knob > Line color	Knob Line color. It can be set by color picker or input RGB value.
background color	Part and State > Knob > size	Part and State > Knob > size	Knob size. The values should be between 0 and 20.
Background gradient direction	Part and State > Knob > Background gradient direction	Part and State > Knob > Background gradient direction	Gradient direction of background color in knob part, vertical or horizontal.
Opacity	Part and State > Knob > opacity	Part and State > Knob > opacity	Background opacity of Knob part. The value should be between 0 and 255.

4.5 Bar

The bar object has a background and an indicator on it. The width of the indicator is set according to the current value of the bar.

Vertical bars can be created if the width of the object is smaller than its height.

Not only end, but the start value of the bar can be set, which changes the start position of the indicator.



Property	v7	v8	Description
Animtime	Attribute > Animtime	Attribute > Animation time	The animation time of Bar value.

Property	v7	v8	Description
Animation mode	N/A	Attribute > Animation mode	The animation mode, normal, and symmetrical.
Bar value	Attribute > Bar value	Attribute > Bar value	Can set value of the Bar widget.
state	Part and State > Main > state	Part and State > Main > state	Style of main part. Defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings are invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of main part. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity of main part. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color in main part, vertical, or horizontal.
Radius	Part and State > Main > Radius	Part and State > Main > Radius	Radius of Border: 0-200.
Padding top, bottom, left, right	Part and State > Main > Padding top, bottom, left, right	N/A	Padding for the width. The value should be between 1 and 20.
state	Part and State > Indicator > state	Part and State > Indicator > state	Style of Active part. It can be defined by one state or more states.
Disable	Part and State > Indicator > Disable	Part and State > Indicator > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Indicator > Background color	Part and State > Indicator > Background color	Background color of Active part. It can be set by color picker or input RGB value.
Opacity	Part and State > Indicator > Opacity	Part and State > Indicator > Opacity	Background opacity of Active part. The value should be between 0 and 255.
Background gradient direction	Part and State > Indicator > Background gradient direction	Part and State > Indicator > Background gradient direction	Gradient direction of background color in main part, vertical, or horizontal.

4.6 Button

The buttons are simple rectangle-like objects. They are derived from [Containers](#) so the [layout](#) and [fit](#) are also available. They can be enabled to automatically transition to the checked state on click.

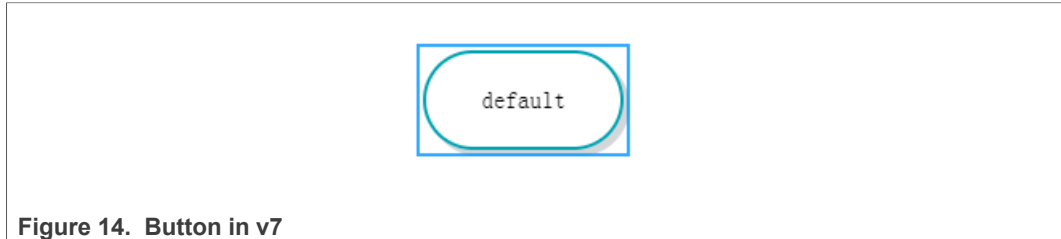


Figure 14. Button in v7



Figure 15. Button in v8

Table 13. Button properties

Property	v7	v8	Description
Text, text color	Attribute > Text, text color	Attribute > Text, text color	Text color. It can be set by color picker or input RGB value.
Toggle	Attribute > Toggle	Attribute > Toggle	Enable or disable the toggle button.
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Font color	Part and State > Main > font color	Part and State > Main > font color	
Font size	Part and State > Main > font size	Part and State > Main > font size	
align	Part and State > Main > align	Part and State > Main > align	Left, center, right.
Border width	Part and State > Main > Border width	Part and State > Main > Border width	Width of border line. The value can be 1 to 5.
Border color	Part and State > Main > Border color	Part and State > Main > Border color	Color of border. It can be set by color picker or input RGB value.

Table 13. Button properties...continued

Property	v7	v8	Description
Border opacity	Part and State > Main > Border opacity	Part and State > Main > Border opacity	Border opacity. The value should be between 0 and 255.
Border radius	Part and State > Main > Border radius	Part and State > Main > Border radius	Radius of Border: 0-200.

4.7 Button matrix

The button matrix objects can display multiple buttons in rows and columns. The main reasons for wanting to use a button matrix instead of a container and individual button objects are:

- The button matrix is simpler to use for grid-based button layouts.
- The button matrix consumes less memory per button.

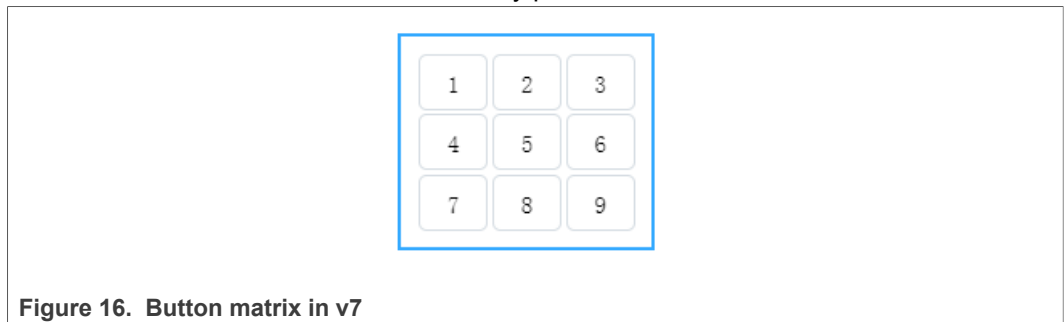


Figure 16. Button matrix in v7

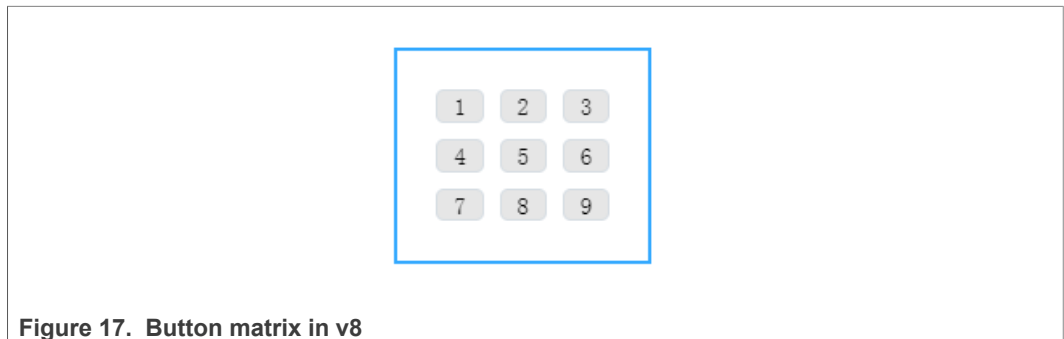


Figure 17. Button matrix in v8

Table 14. Button matrix properties

Property	v7	v8	Description
button	Attribute > button item	Attribute > button	
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.

Table 14. Button matrix properties...continued

Property	v7	v8	Description
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Radius	Part and State > Main > Radius	Part and State > Main > Border Radius	Radius of Border: 0-200
Border color	Part and State > Main > Border color	Part and State > Main > Border color	Color of border. It can be set by color picker or input RGB value.
Border width	Part and State > Main > Border width	Part and State > Main > Border width	Width of border line. The value should be between 1 and 5.
Padding top, bottom, left, right	Part and State > Main > Padding top, bottom, left, right	Part and State > Main > Padding top, bottom, left, right	Padding for the width. The value should be between 1 and 20.
Padding inner	Part and State > Main > Padding inner	N/A	Padding for the Button space.
Padding row & column	N/A	Part and State > Main > Padding row & column	Row and column for Items group.
state	Part and State > Items > state	Part and State > Items > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Items > Disable	Part and State > Items > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	Part and State > Items > Text color	Part and State > Items > Font color	Color for the text
Font family, font size	Part and State > Items > Font family, font size	Part and State > Items > Font family, font size	Font family and size settings, the size can be a value between 0 and 100.
Background color	Part and State > Items > Background color	Part and State > Items > Background color	Background color of widget. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > Items > Background gradient direction	Part and State > Items > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Opacity	Part and State > Items > Opacity	Part and State > Items > Opacity	Background opacity. The value should be between 0 and 255.
Border color	Part and State > Items > Border color	Part and State > Items > Border color	Color of border. It can be set by color picker or input RGB value.
Border width	Part and State > Items > Border width	Part and State > Items > Border width	

Table 14. Button matrix properties...continued

Property	v7	v8	Description
Radius	Part and State > Items > Radius	Part and State > Items > Border Radius	Radius of Border: 0-8

4.8 Calendar

The calendar object is a classic calendar which can:

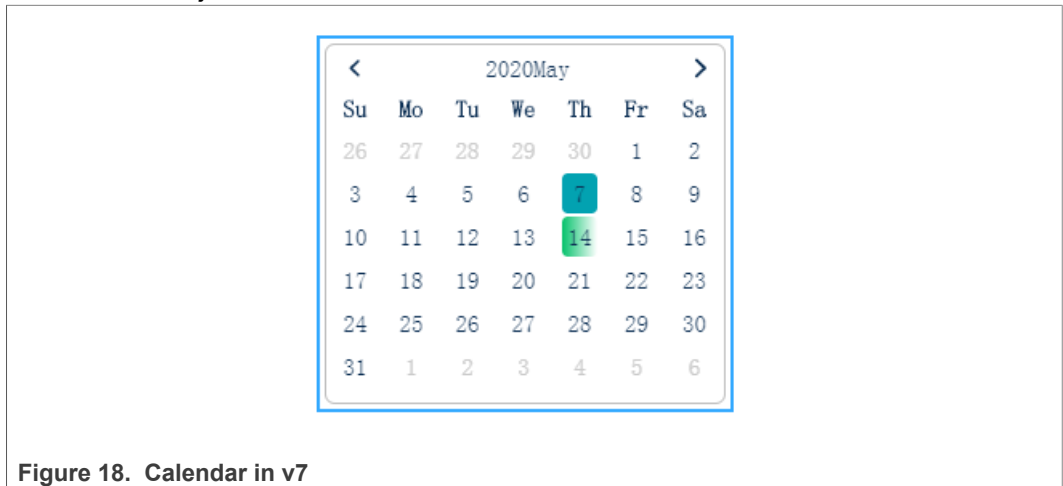


Figure 18. Calendar in v7

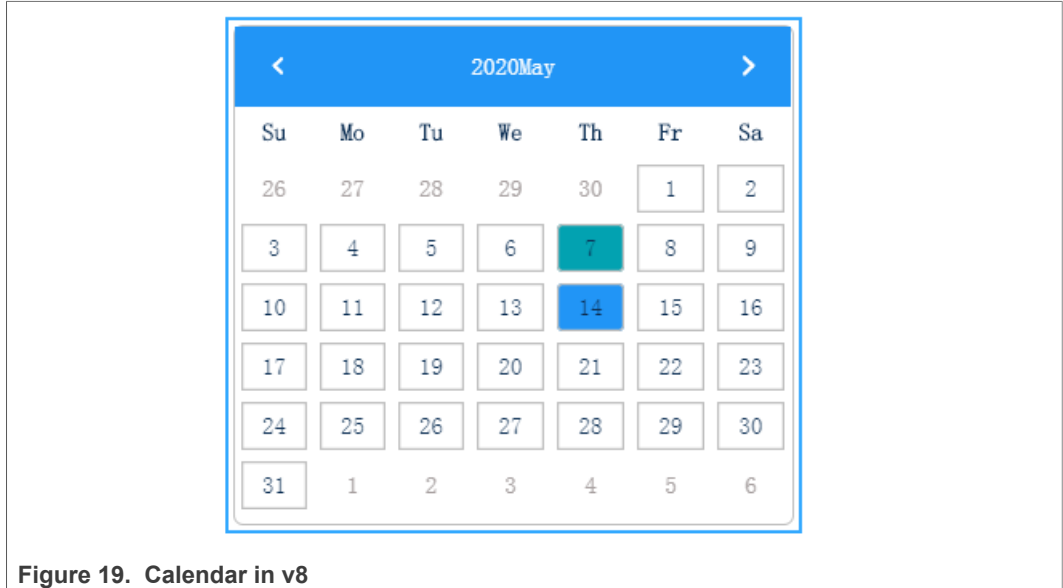


Figure 19. Calendar in v8

Table 15. Calendar properties

Property	v7	v8	Description
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.

Table 15. Calendar properties...continued

Property	v7	v8	Description
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Border color	Part and State > Main > Border color	Part and State > Main > Border color	Color of border. It can be set by color picker or input RGB value.
Border width	Part and State > Main > Border width	Part and State > Main > Border width	Width of border line. Value can be 1 or 2.
state	Part and State > Header > state	Part and State > header > state	Style of header part. It can be defined by one state or more states.
Disable	Part and State > Header > Disable	Part and State > header > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	Part and State > Header > Text color	Part and State > header > Font color	Text color in head part. It can be set by color picker or input RGB value.
Font family, font size	Part and State > Header > Font family, font size	Part and State > header > Font family, font size	Font family and size settings in the calendar header, the size can be a value between 0 and 100.
Letter spacing	Part and State > Header > Letter spacing	N/A	The spacing size between letters in the header part.
Background color	N/A	Part and State > header > Background color	Background color of header part. It can be set by color picker or input RGB value.
Opacity	N/A	Part and State > header > Opacity	Background opacity of header part. The value should be between 0 and 255.

Table 15. Calendar properties...continued

Property	v7	v8	Description
Background gradient direction	N/A	Part and State > header > Background gradient direction	Gradient direction of background color in head part: vertical or horizontal.
state	Part and State > Week > state	N/A	Style of day part: it can be defined by one state or more states.
Disable	Part and State > Week > Disable	N/A	Enable or disable a state of day part, the custom settings will be invalidated when a state is disabled.
Text color	Part and State > Week > Text color	N/A	Text color in day part. It can be set by color picker or input RGB value.
Font family, font size	Part and State > Week > Font family, font size	N/A	Font family and size settings in the calendar day part. The size can be a value between 0 and 100.
state	Part and State > Date > state	N/A	Style of date part. It can be defined by one state or more states.
Disable	Part and State > Date > Disable	N/A	Enable or disable a state of date part, the custom settings will be invalidated when a state is disabled.
Text color	Part and State > Date > Text color	N/A	Text color in date part. It can be set by color picker or input RGB value.
Font family, font size	Part and State > Date > Font family, font size	N/A	Font family and size settings in the calendar date part, the size can be a value between 0 and 100.
Background color	Part and State > Date > Background color	N/A	Background color of date part. It can be set by color picker or input RGB value.
Opacity	Part and State > Date > Opacity	N/A	Background opacity of date part: The value should be between 0 and 255.
Background gradient direction	Part and State > Date > Background gradient direction	N/A	Gradient direction of background color in date part: vertical or horizontal.

Table 15. Calendar properties...continued

Property	v7	v8	Description
state	N/A	Part and State > Disabled > state	Style of disabled part: it can be defined by one state or more states.
Disable	N/A	Part and State > Days in other month > disabled	Enable or disable a state of disabled part. The custom settings will be invalidated when a state is disabled.
Background color	N/A	Part and State > Days in other month > Background color	Background color of disabled part. It can be set by color picker or input RGB value.
Opacity	N/A	Part and State > Days in other month > Opacity	The background opacity of the next month or last month date.
Background gradient direction	N/A	Part and State > Days in other month > Background gradient direction	Gradient direction of background color in disabled part, vertical or horizontal.
Font color	N/A	Part and State > Days in other month > Font color	Text color in disabled part. It can be set by color picker or input RGB value.
Font family, font size	N/A	Part and State > Days in other month > Font family, font size	Font family and size settings in the calendar disabled part. The size can be a value between 0 and 100.
state	N/A	Part and State > Days in current month > state	Style of current month. It can be defined by one state or more states.
Disable	N/A	Part and State > Days in current month > Disabled	Enable or disable a state of month part. The custom settings will be invalidated when a state is disabled.
Background color	N/A	Part and State > Days in current month > Background color	Background color of current month date, It can be set by color picker or input RGB value.
Opacity	N/A	Part and State > Days in current month > Opacity	The background opacity of current month date.

Table 15. Calendar properties...continued

Property	v7	v8	Description
Background gradient direction	N/A	Part and State > Days in current month > Background gradient direction	Gradient direction of background color in current month date: vertical or horizontal.
Border color	N/A	Part and State > Days in current month > Border color	Border color of current month date. It can be set by color picker or input RGB value.
Border width	N/A	Part and State > Days in current month > Border width	Border width of current month date. The value can be 1 or 2.
Font color	N/A	Part and State > Days in current month > Font color	Text color of current month date. It can be set by color picker or input RGB value.
Font family, font size	N/A	Part and State > Days in current month > Font family, font size	Font family and size settings for current month date. The size can be a value between 0 and 100.
state	N/A	Part and State > weekday names > state	Style of week part. It can be defined by one state or more states.
Disable	N/A	Part and State > weekday names > disabled	Enable or disable a state of week part. The custom settings will be invalidated when a state is disabled.
Font color	N/A	Part and State > weekday names > Font color	Text color of week part: it can be set by color picker or input RGB value.
Font family, font size	N/A	Part and State > weekday names > Font family, font size	Font family and size settings for week part. The size can be a value between 0 and 100.
state	N/A	Part and State > Today > state	Style of today. It can be defined by one state or more states.
Disable	N/A	Part and State > Today > Disabled	Enable or disable a state of today. The custom settings will be invalidated when a state is disabled.
Background color	N/A	Part and State > Today > Background color	Background color of today. It can be set by color picker or input RGB value.

Table 15. Calendar properties...continued

Property	v7	v8	Description
Opacity	N/A	Part and State > Today > Opacity	The background opacity of today.
Background gradient direction	N/A	Part and State > Today > Background gradient direction	Gradient direction of background color for today: vertical or horizontal.
Font color	N/A	Part and State > Today > Font color	Text color of today: it can be set by color picker or input RGB value.
Font family, font size	N/A	Part and State > Today > Font family, font size	Font family and size settings for today. The size can be a value between 0 and 100.
state	N/A	Part and State > Highlight day > state	Style of highlight part. It can be defined by one state or more states.
Disable	N/A	Part and State > Highlight day > Disabled	Enable or disable a state of highlight part. The custom settings will be invalidated when a state is disabled
Background color	N/A	Part and State > Highlight day > Background color	Background color of highlight part. It can be set by color picker or input RGB value.
Opacity	N/A	Part and State > Highlight day > Opacity	The background opacity of highlight date.
Background gradient direction	N/A	Part and State > Highlight day > Background gradient direction	Gradient direction of background color for highlight date: vertical or horizontal.
Font color	N/A	Part and State > Highlight day > Font color	Text color of highlight date. It can be set by color picker or input RGB value.
Font family, font size	N/A	Part and State > Highlight day > Font family, font size	Font family and size settings for highlight date. The size can be a value between 0 and 100.

4.9 Canvas

A canvas inherits from [Image](#) where the user can draw anything. Rectangles, texts, images, and lines arcs can be drawn here using the drawing engine of LVGL. Besides some "effects" can be applied as well like rotation, zoom, and blur.

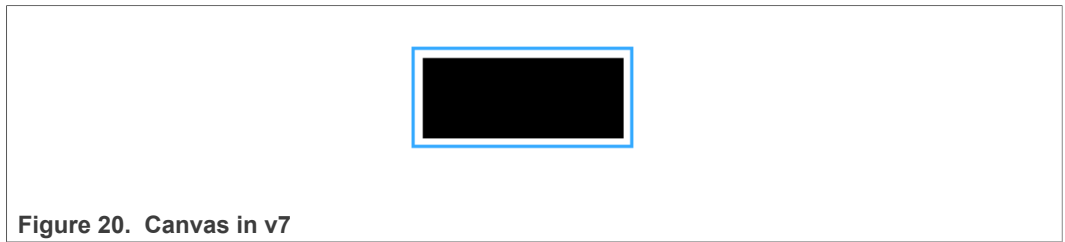


Figure 20. Canvas in v7

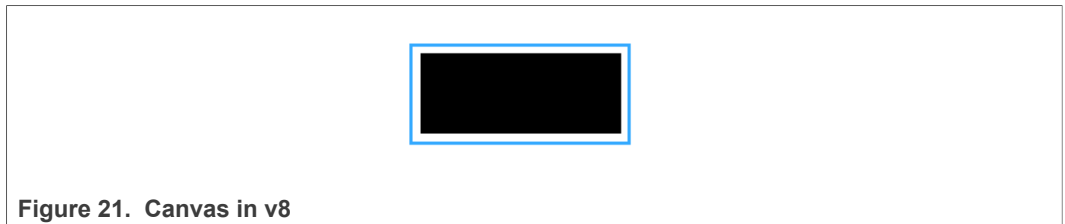


Figure 21. Canvas in v8

Table 16. Canvas properties

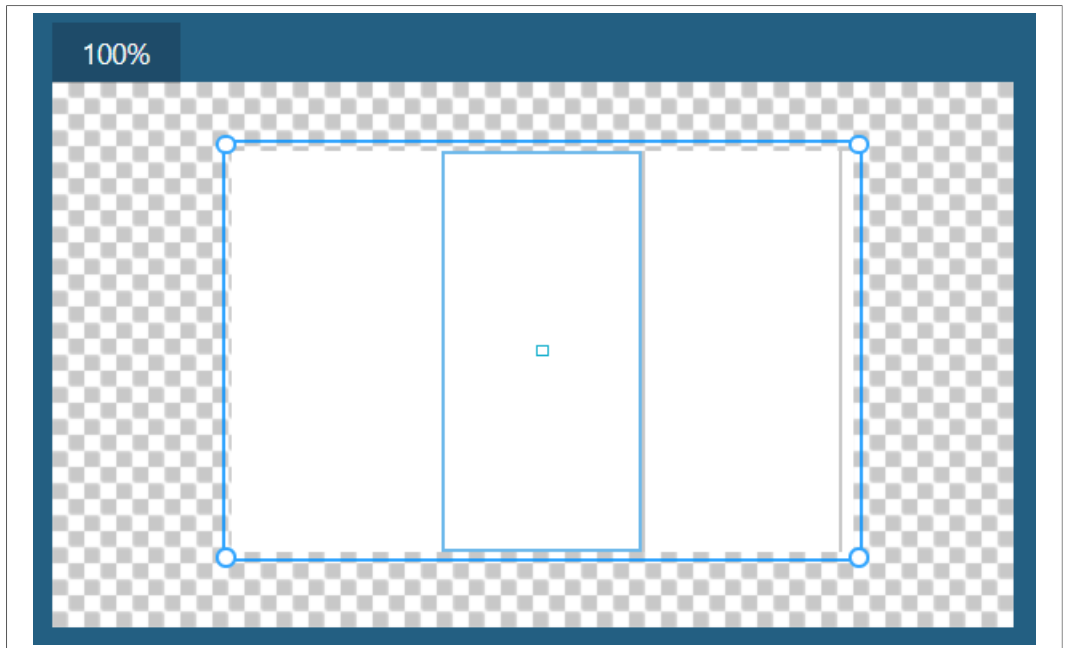
Property	v7	v8	Description
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > disable	Part and State > Main > disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.

4.10 Carousel

The carousel widget can display two or more pieces of content in a carousel format.

The following is the usage example of carousel widget.

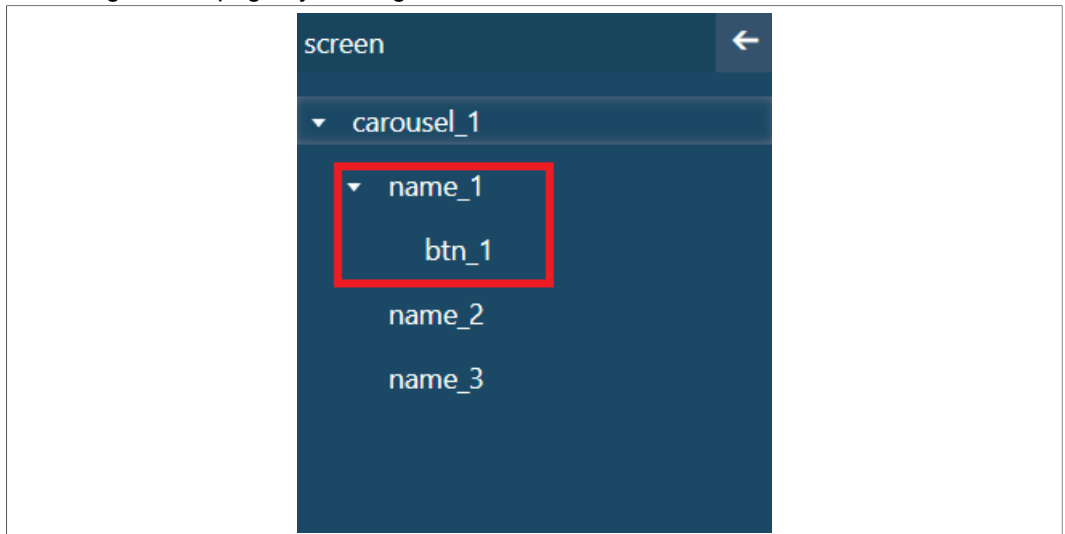
1. Drag the carousel widget into the editor.



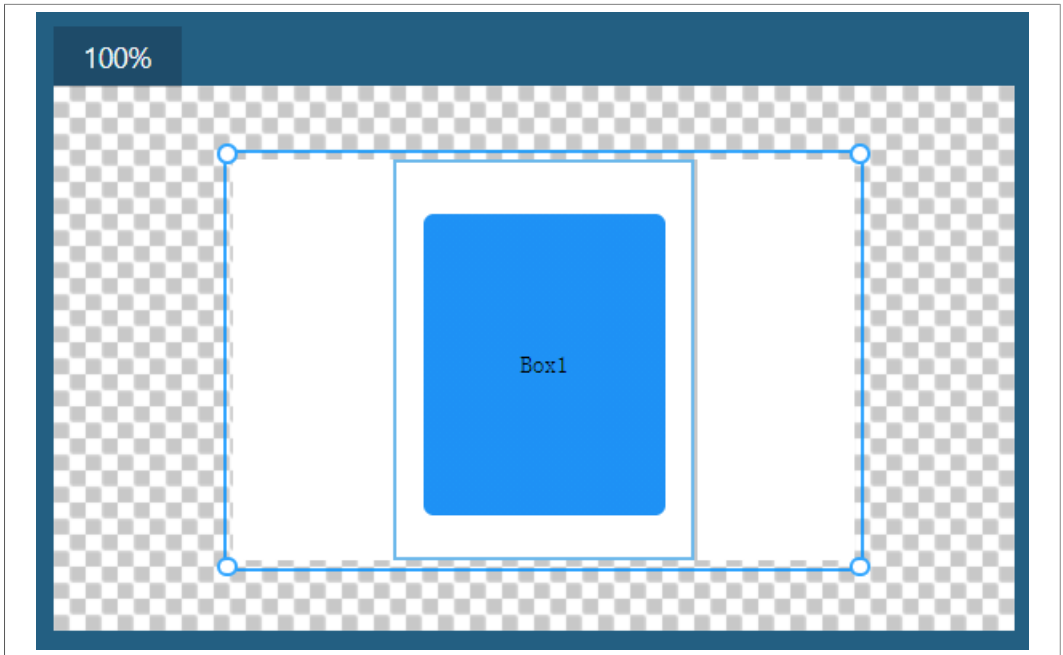
2. Set the page width and page number in the attribute setting window.



3. Navigate to a page by clicking the resource tree.



4. Drag the widget into the carousel page and set widget attributes.



5. Repeat step 4 for each page of the carousel widget.

6. Run the project. The pages are displayed in a carousel format.

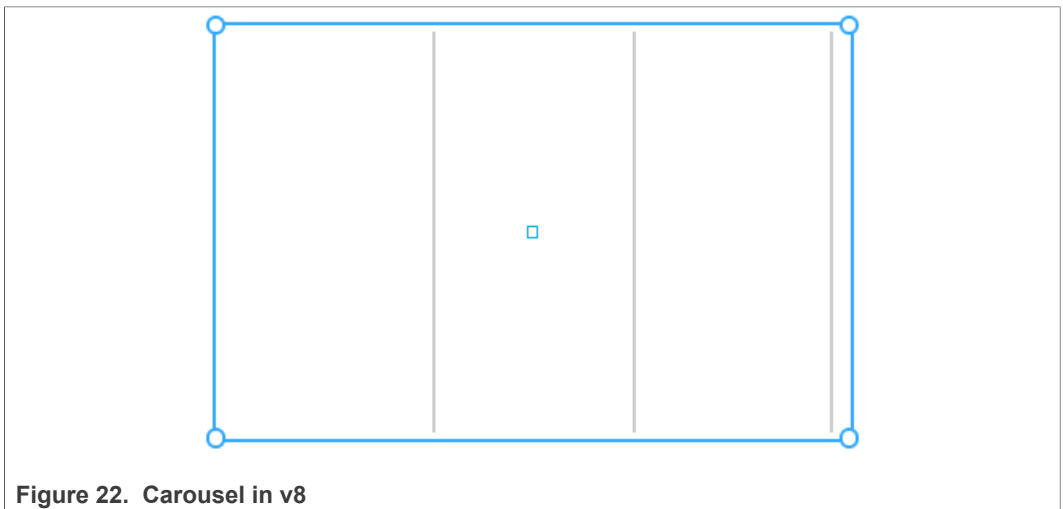


Figure 22. Carousel in v8

Table 17. Carousel properties

Property	v8	Description
width	Attribute > width	the page width.
Page	Attribute > add page	add the multiple pages.
state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings are invalidated when a state is disabled.

Table 17. Carousel properties...continued

Property	v8	Description
background color	Part and State > Main > background color	Background color of widget. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
state	Part and State > Scrollbar > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Scrollbar > Disable	Enable or disable a state. The custom settings are invalidated when a state is disabled.
background color	Part and State > Scrollbar > background color	Scrollbar color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Scrollbar > Opacity	Scrollbar opacity. The value should be between 0 and 255.

4.11 Chart

The charts are a basic object to visualize data points. They support *Line* charts (connect points with lines and/or draw points on them) and *Column* charts.

Charts also support division lines, 2 y axis, axis ticks, and texts on ticks. The number of chart points must be 10.

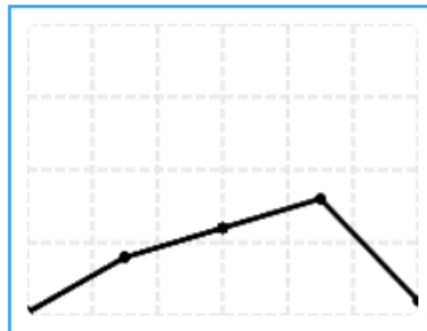


Figure 23. Chart in v7

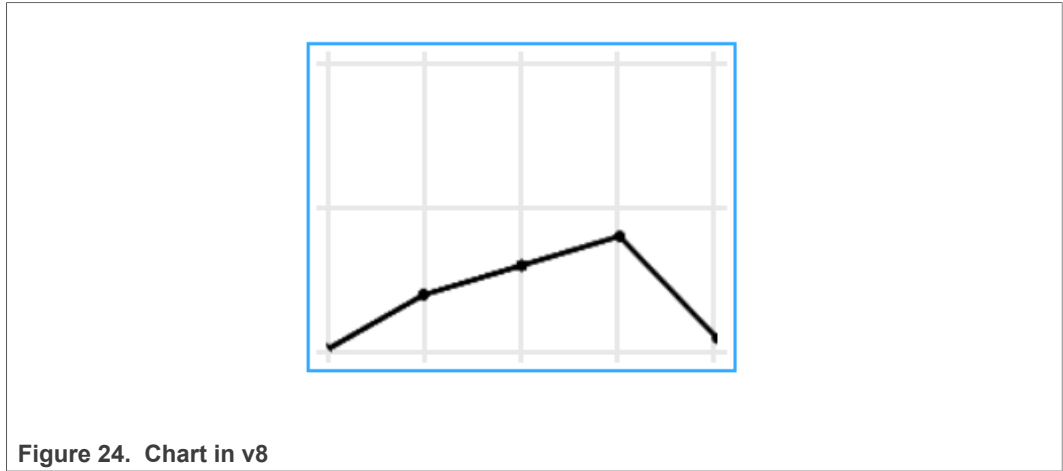


Table 18. Chart properties

Property	v7	v8	Description
Line numbers row and column	Attribute > Line numbers row and column	Attribute > Line numbers row and column	Line of chart. Row line and column line of chart.
Range	Attribute > Range	Attribute > Range	Value range of the chart, the min value is 0. There is no max value limit.
Chart type	Attribute > Chart type	Attribute > Chart type	Type of chart. It includes line and bar.
Chart data	Attribute > Chart data	Attribute > Chart type	Data of the chart, the length of data is point count.
state	Part and State > Main > state	Part and State > Main > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state of today. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color for highlight date: vertical or horizontal.

Table 18. Chart properties...continued

Property	v7	v8	Description
state	Part and State > Lines > state	N/A	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Lines > Disable	N/A	Enable or disable a state of today, the custom settings will be invalidated when a state is disabled
Line color	Part and State > Lines > Line color	Part and State > Main > Line color	Color of background line.
Line opacity	Part and State > Lines > Line opacity	Part and State > Main > Line opacity	Background line opacity. The value should be between 0 and 255.
Line width	Part and State > Lines > Line width	Part and State > Main > Line width	Background line width. The value should be between 0 and 4.

4.12 Checkbox

The checkbox objects are built from a [Button](#) background which contains a Button *bullet* and a [Label](#) to realize a classical checkbox.

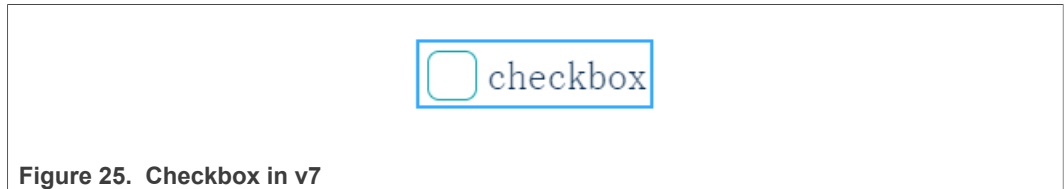


Figure 25. Checkbox in v7

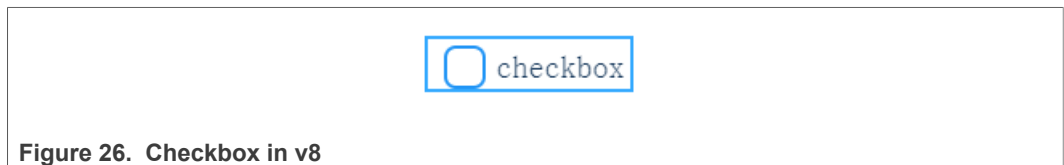


Figure 26. Checkbox in v8

Table 19. Checkbox properties

Property	v7	v8	Description
Text	Attribute > Text	Attribute > Text	Text for checkbox.
state	Part and State > Main > state	Part and State > Main > state	Style of highlight part. It can be defined by one state or more states.
Text color	Part and State > Main > Text color	Part and State > Main > Font color	Color of the text.
Font famil, font size	Part and State > Main > Font famil, font size	Part and State > Main > Font famil, font size	Text font setting, includes font family and font size.

Table 19. Checkbox properties...continued

Property	v7	v8	Description
Letter spacing	Part and State > Main > Letter spacing	Part and State > Main > Letter spacing	The spacing size between letters in the Text
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state of today. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color for highlight date: vertical or horizontal.
Radius	Part and State > Main > Radius	Part and State > Main > Radius	Radius of Border: 0-200.
state	Part and State > indicator > state	Part and State > indicator > state	Style of highlight part. It can be defined by one state or more states.
Background color	Part and State > indicator > Background color	Part and State > indicator > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > indicator > Opacity	Part and State > indicator > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > indicator > Background gradient direction	Part and State > indicator > Background gradient direction	Gradient direction of background color for highlight date: vertical or horizontal.
Border color	Part and State > indicator > Border color	Part and State > indicator > Border color	Border color of widget: It can be set by color picker or input RGB value.
Border width	Part and State > indicator > Border width	Part and State > indicator > Border width	Border width: The value should be between 0 and 4.
Radius	Part and State > indicator > Radius	Part and State > indicator > Radius	Radius of Border: 0-200.

4.13 Color picker

As its name implies, the *Color picker* helps select the color. The *Hue*, *Saturation*, and *Value* of the color can be selected after each other. The widget has two forms: circle (disc) and rectangle. In both forms, when long pressing the object, the color picker changes to the next parameter of the color (hue, saturation or value). The double-click resets the current parameter.



Figure 27. Color picker in v7

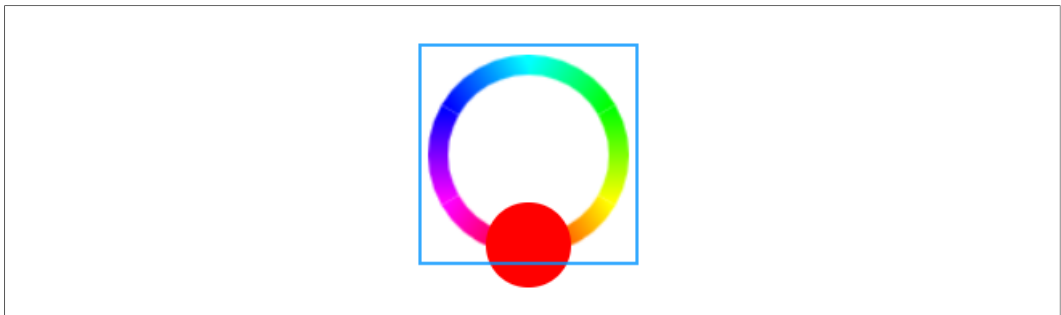


Figure 28. Color picker in v8

Table 20. Color picker properties

Property	v7	v8	Description
state	Part and State > Main > state	Part and State > Main > state	Size of widget. Set the width and height of the widget.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Style of main part. It can be defined by one state or more states.
Scale width	Part and State > Main > Scale width	Part and State > Main > Scale width	Scale width of the color picker: 0-50.
padding	Part and State > Main > padding	Part and State > Main > padding	Padding of the scale: 0-20.
Type	Part and State > Main > Type	N/A	Color picker type: Disc and Rect

4.14 Container

The containers are essentially a basic object with layout and automatic sizing features.

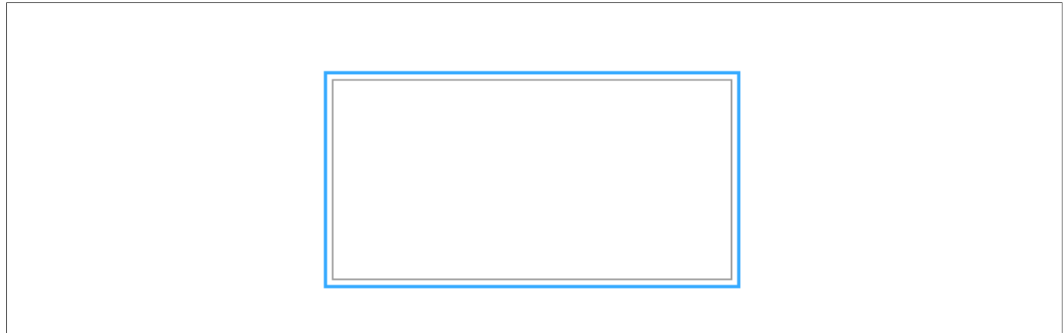


Figure 29. Container in v7

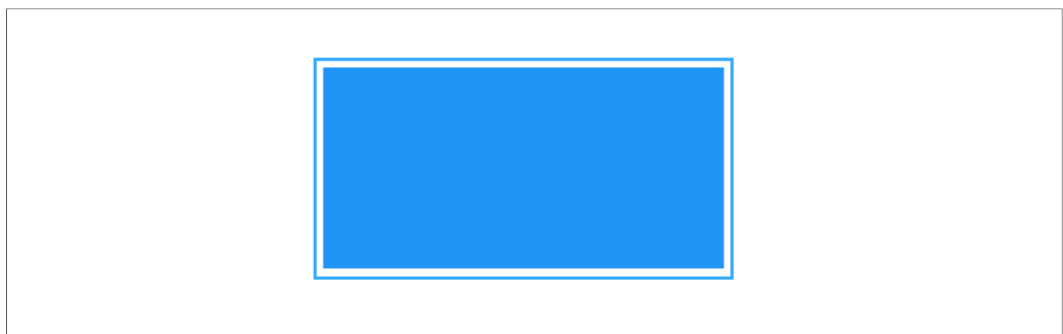


Figure 30. Container in v8

Table 21. Container properties

Property	v7	v8	Description
Remove all style	General Setting > Remove all style	General Setting > Remove all style	Enabling this item removes all custom added style.
state	Part and State > Main > state	Part and State > Main > state	Style of main. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state of month part, the custom settings will be invalidated when a state is disabled
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Border color	Part and State > Main > Border color	Part and State > Main > Border color	Color of border. It can be set by color picker or input RGB value.
Border opacity	Part and State > Main > Border opacity	Part and State > Main > Border opacity	Opacity of border line: It can be set by the slider.
Border width	Part and State > Main > Border width	Part and State > Main > Border width	Width of Border: max:10.

Table 21. Container properties...continued

Property	v7	v8	Description
Padding top, bottom, left, right	Part and State > Main > Padding top, bottom, left, right	Part and State > Main > Padding top, bottom, left, right	Padding for the width. The value should be between 1 and 20.
Radius	Part and State > Main > Radius	Part and State > Main > Border Radius	Radius of Border: 0-200.

4.15 Digital clock

The following are the details of the digital clock widget.

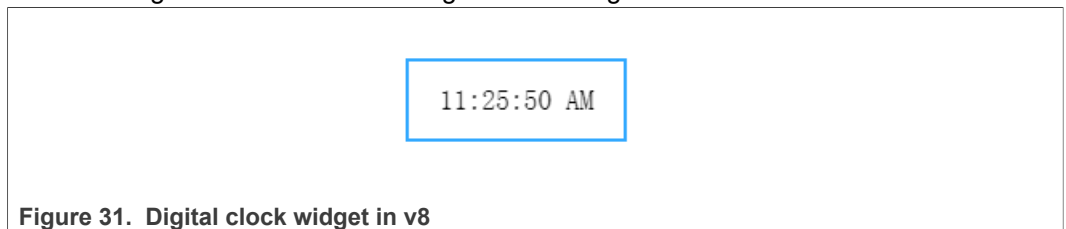


Figure 31. Digital clock widget in v8

Table 22. Digital clock properties

Property	v7	v8	Description
Initial Time		Attribute > Initial Time	Initial time format is 00:00:00
Show Second		Attribute > Second	
Use AM/PM		Attribute > AM/PM	
State		Part and State > Main > State	
Disable		Part and State > Main > Disable	
Font color		Part and State > Main > Font color	
Font family, font size		Part and State > Main > Font family, font size	
Letter spacing		Part and State > Main > Letter spacing	max:10
Background color		Part and State > Main > Background color	
Opacity		Part and State > Main > Opacity	
Background gradient direction		Part and State > Main > Background gradient direction	max: 255
Radius		Part and State > Main > Radius	max: 100

4.16 Drop-down list

The drop-down list allows the user to select one value from a list.

The drop-down list is closed by default and displays a single value or a predefined text. Click the drop-down list and select an option. When the user selects a new value, the list is deleted.

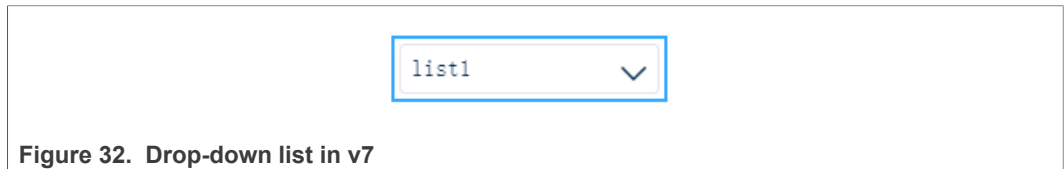


Figure 32. Drop-down list in v7

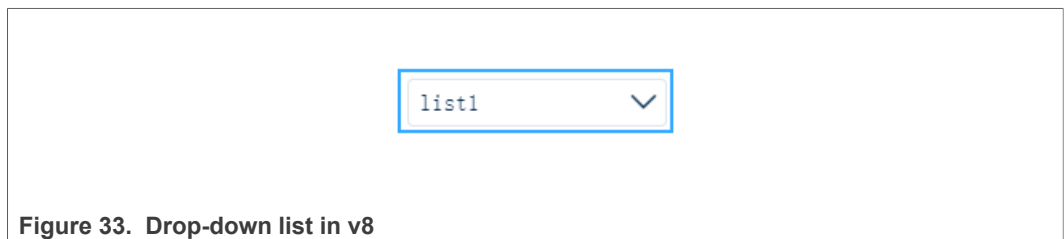


Figure 33. Drop-down list in v8

Table 23. Drop-down list properties

Property	v7	v8	Description
Draw arrow	Attribute > arrow	Attribute > arrow	Set whether to add a drop-down arrow.
Text	Attribute > Text	Attribute > Text	The contents of each row in the list.
Add list	Attribute > Add item	Attribute > Add item	To add a list.
state	Part and State > Main > state	Part and State > Main > state	Style of main: It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state of month part. The custom settings will be invalidated when a state is disabled
Text color	Part and State > Main > Text color	Part and State > Main > Font color	Font color in the header: It can be set by color picker or input RGB value.
Font family, font size	Part and State > Main > Font family, font size	Part and State > Main > Font family, font size	Font family and size settings in the header part. The size can be a value between 0 and 100.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Border color	Part and State > Main > Border color	Part and State > Main > Border color	Color of border. It can be set by color picker or input RGB value.

Table 23. Drop-down list properties...continued

Property	v7	v8	Description
Border width	Part and State > Main > Border width	Part and State > Main > Border width	Width of the border: max:4.
Radius	Part and State > Main > Radius	Part and State > Main > Radius	Radius of the border: 0-200.
Padding top, bottom, left, right	Part and State > Main > Padding top, bottom, left, right	Part and State > Main > Padding top, bottom, left, right	Padding for the width. The value should be between 1 and 20.
state	Part and State > Selected > state	Part and State > Selected > state	Style of selected part. It can be defined by one state or more states.
Disable	Part and State > Selected > Disable	Part and State > Selected > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	Part and State > Selected > Text color	Part and State > Selected > Font color	Font color in the selected item: It can be set by color picker or input RGB value.
Font family, font size	Part and State > Selected > Font family, font size	Part and State > Selected > Font family, font size	Font family and size settings in the selected item, the size can be a value between 0 and 100.
Background color	Part and State > Selected > Background color	Part and State > Selected > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Selected > Opacity	Part and State > Selected > Opacity	Background opacity in the selected item: The value should be between 0 and 255.
Background gradient direction	Part and State > Selected > Background gradient direction	Part and State > Selected > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Border color	Part and State > Selected > Border color	Part and State > Selected > Border color	Color of the selected item border: It can be set by color picker or input RGB value.
Border width	Part and State > Selected > Border width	Part and State > Selected > Border width	width of the selected item Border: max:4.
Radius	Part and State > Selected > Radius	Part and State > Selected > Radius	Radius of the selected item Border: 0-200.
Padding top, bottom, left, right	Part and State > Selected > Padding top, bottom, left, right	Part and State > Selected > Padding top, bottom, left, right	Padding for the width. The value should be between 1 and 20.
state	Part and State > List > state	Part and State > List > state	Style of listed part. It can be defined by one state or more states.
Disable	Part and State > List > Disable	Part and State > List > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.

Table 23. Drop-down list properties...continued

Property	v7	v8	Description
Text color	Part and State > List > Text color	Part and State > List > Text color	Font color in other unselected items: It can be set by color picker or input RGB value.
Font family, font size	Part and State > List > Font family, font size	Part and State > List > Font family, font size	Font family and size settings in other unselected items, the size can be a value between 0 and 100.
Background color	Part and State > List > Background color	Part and State > List > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > List > Opacity	Part and State > List > Opacity	Background opacity in other unselected items: The value should be between 0 and 255
Background gradient direction	Part and State > List > Background gradient direction	Part and State > List > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Border color	Part and State > List > Border color	Part and State > List > Border color	Color of drop-down part border. It can be set by color picker or input RGB value.
Border width	Part and State > List > Border width	Part and State > List > Border width	Width of drop-down part. Border: max:4
Radius	Part and State > List > Radius	Part and State > List > Radius	Radius of drop-down part. Border: 0-200.
Padding top, bottom, left, right	Part and State > List > Padding top, bottom, left, right	Part and State > List > Padding top, bottom, left, right	Padding for the width. The value should be between 1 and 20.
List height	x	Part and State > List > List Height	The height of the drop-down part.
state	x	Part and State > scrollbar > state	Style of scroll bar. It can be defined by one state or more states.
Disable	x	Part and State > scrollbar > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	x	Part and State > scrollbar > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	x	Part and State > scrollbar > Opacity	Background opacity in other unselected items: The value should be between 0 and 255.
Background gradient direction	x	Part and State > scrollbar > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Radius	x	Part and State > scrollbar > Radius	Radius of scroll bar: 0-200

4.17 Gauge

The gauge is a meter with scale labels and one or more needles.

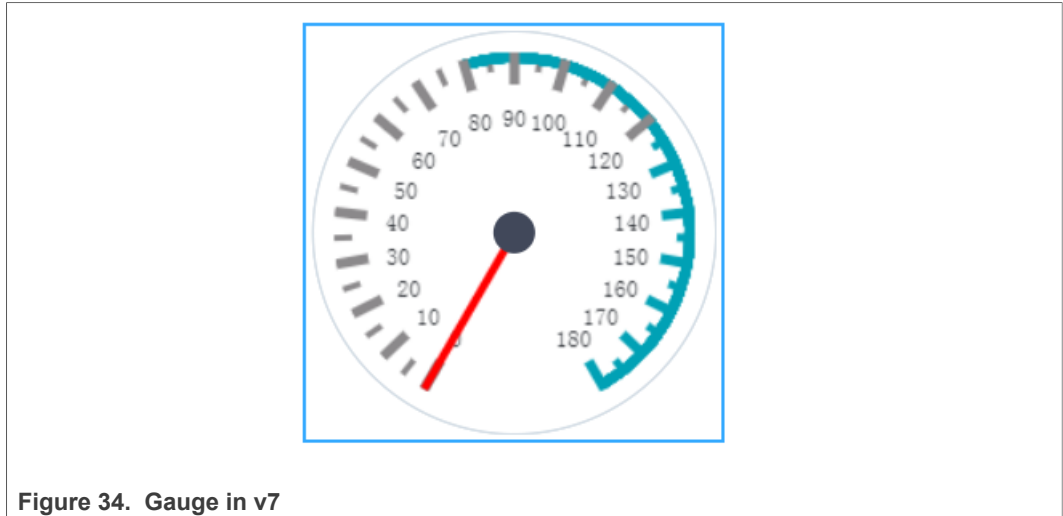


Figure 34. Gauge in v7

Table 24. Gauge properties

Property	v7	v8	Description
Dial Major & Dial Minor	Attribute > Major & Minor		The value of the major and minor.
Min value & Max value	Attribute > Min & Max		The value of the start and stop
Image Needle	Attribute > Image Needle		To set the needle image.
Angle	Attribute > Angle		To set the angle value.
needles color & value	Attribute > needles color & value		The value of needles color.
Critical	Attribute > Critical		The value of the critical.
state	Part and State > Main > state		Style of head part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable		Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Color	Part and State > Main > Color		Font color: It can be set by color picker or input RGB value.
Font family, font size	Part and State > Main > Font family, font size		Font family and size settings in the main part, the size can be a value between 0 and 100.
Letter space	Part and State > Main > Letter space		To set the letter space of the value.
Background color	Part and State > Main > Background color		Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity		Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction		Gradient direction of background color: vertical or horizontal.

Table 24. Gauge properties...continued

Property	v7	v8	Description
padding	Part and State > Main > padding		The padding of the number and line.
Line color	Part and State > Main > Line color		The line color: It can be set by color picker or input RGB value.
Line opacity	Part and State > Main > Line opacity		The line opacity: 0-255.
Line width	Part and State > Main > Line width		The line width: 0-20.
Scale width	Part and State > Main > Scale width		The scale line width: 0-21.
Scale grad color	Part and State > Main > Scale grad color		The scale grad color: it can be set by color picker or input RGB value.
Scale end color	Part and State > Main > Scale end color		The scale end color: it can be set by color picker or input RGB value.
Scale border width	Part and State > Main > Scale border width		The start scale border line width: 0-30.
Scale end border width	Part and State > Main > Scale end border width		The end scale border width: 0-30.
Scale end line width	Part and State > Main > Scale end line width		The end scale border line width: 0-6.
state	Part and State > Major > state		Style of head part. It can be defined by one state or more states.
Disable	Part and State > Major > Disable		Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Line color	Part and State > Major > Line color		The major line color.
Line opacity	Part and State > Major > Line opacity		The major line opacity: 0-255.
Line width	Part and State > Major > Line width		The major line width: 0-20.
Scale width	Part and State > Major > Scale width		The major scale width: 0-30.
Scale grad color	Part and State > Major > Scale grad color		The scale grad color: it can be set by color picker or input RGB value.
Scale end color	Part and State > Major > Scale end color		The scale end color: it can be set by color picker or input RGB value.
Scale end line width	Part and State > Major > Scale end line width		max:6
state	Part and State > Needle > state		Style of needle part. It can be defined by one state or more states.
Disable	Part and State > Needle > Disable		Enable or disable a state. The custom settings will be invalidated when a state is disabled.

Table 24. Gauge properties...continued

Property	v7	v8	Description
Background color	Part and State > Needle > Background color		Background color of needle: It can be set by color picker or input RGB value
Opacity	Part and State > Needle > Opacity		Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Needle > Background gradient direction		Gradient direction of background color: vertical or horizontal.
padding	Part and State > Needle > padding		The padding of the needle and line: 0-20
Line opacity	Part and State > Needle > Line opacity		The opacity of the needle: 0-255
Line width	Part and State > Needle > Line width		The line width of the needle: 0-20
size	Part and State > Needle > size		The center pointer size of the needle: 0-20

4.18 Image

The images are the basic object to display from the flash (as arrays) or externally as files. Images can display symbols (LV_SYMBOL_...) too.

Using the [Image decoder interface](#) custom image formats can be supported as well.



Table 25. Image properties

Property	v7	v8	Description
Color format	Attribute > Color format	Attribute > Color format	True Color is for RGB image and True Color Alpha is for ARGB image.

Table 25. Image properties...continued

Property	v7	v8	Description
Rotate center	Attribute > Rotate center	Attribute > Rotate X,Y	Rotate center of widget. The pivot point of the rotation.
Rotate angle	Attribute > Rotate angle	Attribute > Rotate angle	Rotate angle of widget. The angle to rotate the widget.
Image Path	Attribute > Image Path	Attribute > Image Path	Image path of widget. Choose an image.
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Filter color	Part and State > Main > Filter color	Part and State > Main > Filter color	Filter color. A color can be mixed with every pixel of image.
Filter opacity	Part and State > Main > Filter opacity	Part and State > Main > Filter opacity	Filter color opacity. The value should be between 0 and 255.

4.19 Image button

The image button is very similar to the simple 'Button' object. The only difference is that it displays user-defined images in each state instead of drawing a rectangle. See the [Button](#) section for details, before reading this section.



Table 26. Image button properties

Property	v7	v8	Description
Text	Attribute > Text	Attribute > Text	Text of widget. Text showed on the widget.
Toggle	Attribute > Toggle	Attribute > Toggle	Toggle of widget. The button could be toggled or not.

Table 26. Image button properties...continued

Property	v7	v8	Description
Released picture	Attribute > Released picture	Attribute > Released picture	Released picture of widget. The image when widget is released.
Pressed picture	Attribute > Pressed picture	Attribute > Pressed picture	Pressed picture of widget. The image when widget is pressed.
Checked released picture	Attribute > Checked released picture	Attribute > Checked released picture	Checked released picture of widget. The image when widget is checked and released.
Checked pressed picture	Attribute > Checked pressed picture	Attribute > Checked pressed picture	Checked pressed picture of widget. The image when widget is checked and pressed.
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	Part and State > Main > Text color	Part and State > Main > Font color	Color of font. It can be set by color picker or input RGB value.
Font family & font size	Part and State > Main > Font family & font size	Part and State > Main > Font family & font size	Font family and size settings for today, the size can be a value between 0 and 100.
Font Align	Part and State > Main > Font Align	Part and State > Main > Font Align	Left, center, right
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Filter color (image recolor)	Part and State > Main > Filter color	Part and State > Main > Filter color	Filter color: A color can be mixed with every pixel of image.
Filter opacity	Part and State > Main > Filter opacity	Part and State > Main > Filter opacity	Filter color opacity. The value should be between 0 and 255.

4.20 Label

A label is the basic object type that is used to display text.

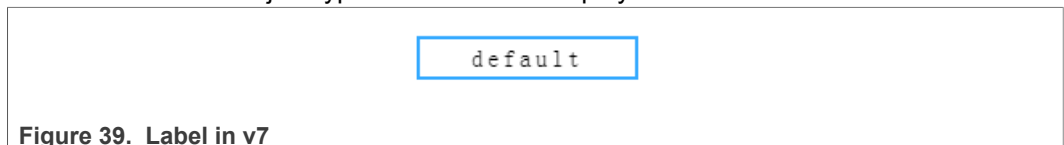


Figure 39. Label in v7



Figure 40. Label in v8

Table 27. Label properties

Property	v7	v8	Description
Text	Attribute > Text	Attribute > Text	Text of widget. Text showed on widget.
Long Mode	N/A	Attribute > Mode	Long mode of widget: By default, the width and height of the label is set to LV_SIZE_CONTENT. Therefore the size of the label is automatically expanded to the text size. Otherwise, if the width or height are explicitly set (using for example, lv_obj_set_width or a layout), the lines wider than the label's width can be manipulated according to several long mode policies.
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	Part and State > Main > Text color	Part and State > Main > Font color	Color of font. It can be set by color picker or input RGB value.
Font family, font size	Part and State > Main > Font family, font size	Part and State > Main > Font family, font size	Font family and size settings for today, the size can be a value between 0 and 100.
Font Align	Part and State > Main > Font Align	Part and State Main > Font Align	Left, center, right
letter spacing	Part and State > Main > letter spacing	Part and State > Main > letter spacing	Letter space. The space between letters, a value between 0 and 10.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	The background opacity.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Padding top, bottom	Part and State > Main > Padding top, bottom	Part and State > Main > Padding top, bottom	Padding in top and bottom side.
Padding left, right	Part and State > Main > Padding left, right	Part and State > Main > Padding left, right	Padding in left and right side.

Table 27. Label properties...continued

Property	v7	v8	Description
Radius	Part and State > Main > Radius	Part and State > Main > Radius	Radius of widget.

4.21 LED

The LED is a rectangle-like (or circle) object. Its brightness can be adjusted. With lower brightness, the colors of the LED become darker.

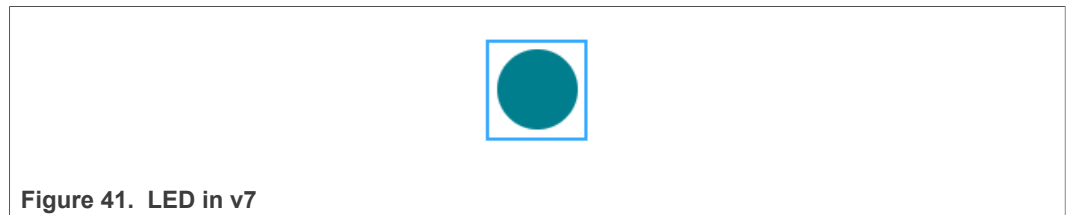


Figure 41. LED in v7



Figure 42. LED in v8

Table 28. LED properties

Property	v7	v8	Description
Bright	Attribute > Bright	N/A	Brightness of widget.
Led Color	N/A	Attribute > Led Color	Color of widget: it can be set by color picker or input RGB value.

4.22 Line

The line object helps draw straight lines between a set of points.

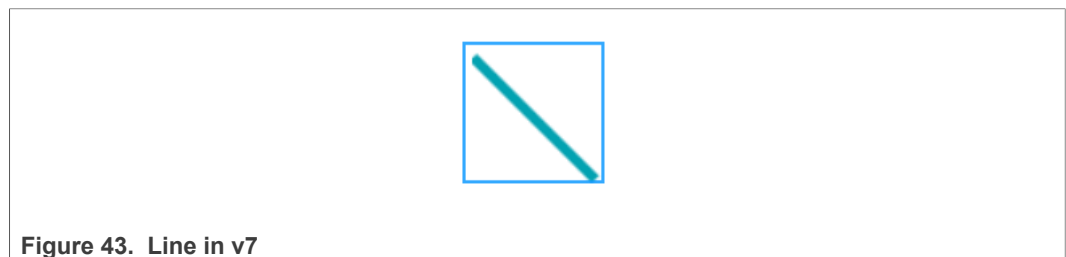


Figure 43. Line in v7

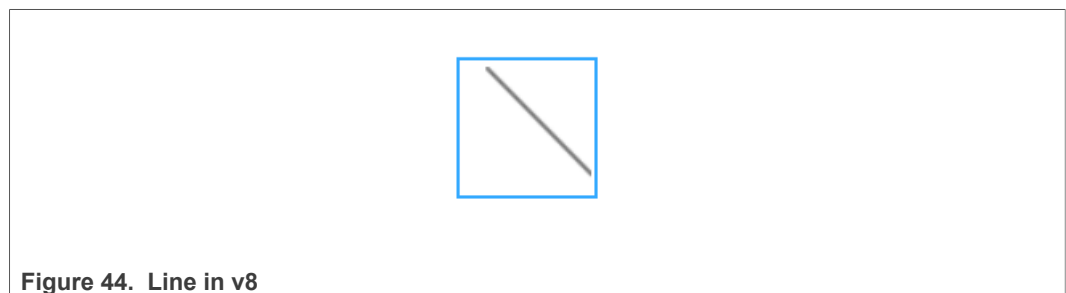


Figure 44. Line in v8

Table 29. Line properties

Property	v7	v8	Description
Line start	Attribute > Line start	N/A	Start point of the line.
Line end	Attribute > Line end	N/A	End point of the line.
line_point	Attribute > Line point	Attribute > Line point	Points connected in the line
Add points	Attribute > add points	Attribute > add points	Can add multiple points.
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Line color	Part and State > Main > Line color	Part and State > Main > Line color	Line color. It can be set by color picker or input RGB value.
Line width	Part and State > Main > Line width	Part and State > Main > Line width	
Line rounder	Part and State > Main > Line rounded	Part and State > Main > Line rounded	Enable line rounding function

4.23 Line meter

The line meter object consists of some radial lines which draw a scale. Setting a value for the Line meter changes the color of the scale lines proportionally.

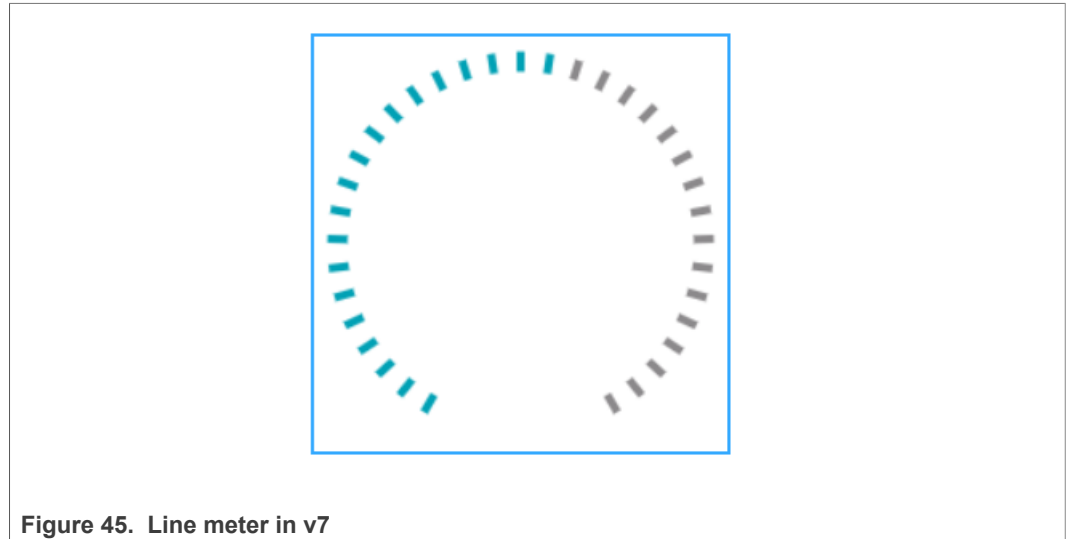


Figure 45. Line meter in v7

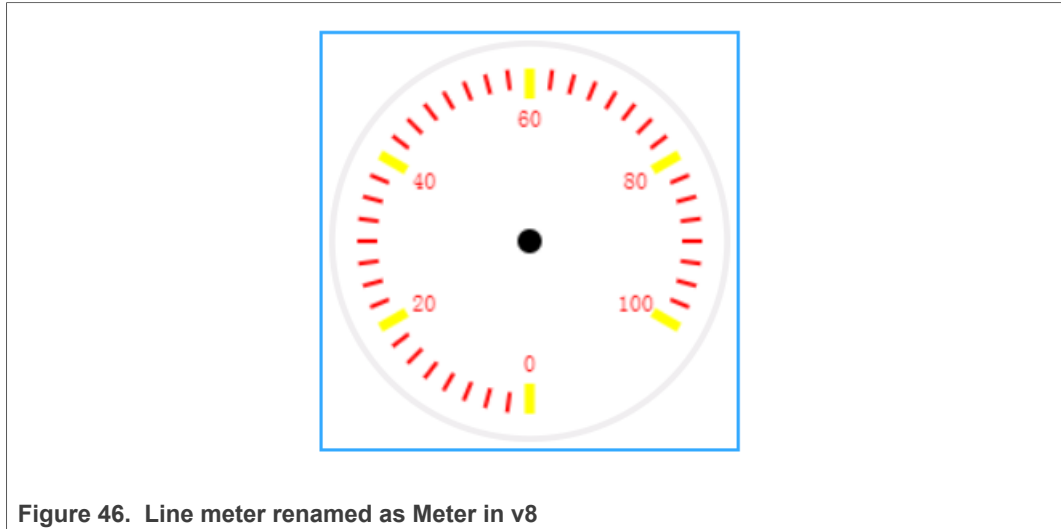


Figure 46. Line meter renamed as Meter in v8

Table 30. Line meter properties

Property	v7	Description
Min & Max	Attribute > Min & Max	
Line	Attribute > Line	
Angle	Attribute > Angle	
Offset	Attribute > Offset	
state	Part and State > Main > state	
Disable	Part and State > Main > Disable	
Background color	Part and State > Main > Background color	
Opacity	Part and State > Main > Opacity	max:255
Background gradient direction	Part and State > Main > Background gradient direction	
Radius	Part and State > Main > Radius	
padding top, bottom, left, right	Part and State > Main > padding top, bottom, left, right	max:20
Line color	Part and State > Main > Line color	
Line opacity	Part and State > Main > Line opacity	max:255
Line width	Part and State > Main > Line width	
Scale color	Part and State > Main > Scale color	
Scale width	Part and State > Main > Scale width	

4.24 List

The lists are built from a background [Page](#) and [Buttons](#) on it. The 'Button' contain an optional icon-like [Image](#) (which can be a symbol too) and a [Label](#). Scrolling capability is included for lists that exceed the defined size.

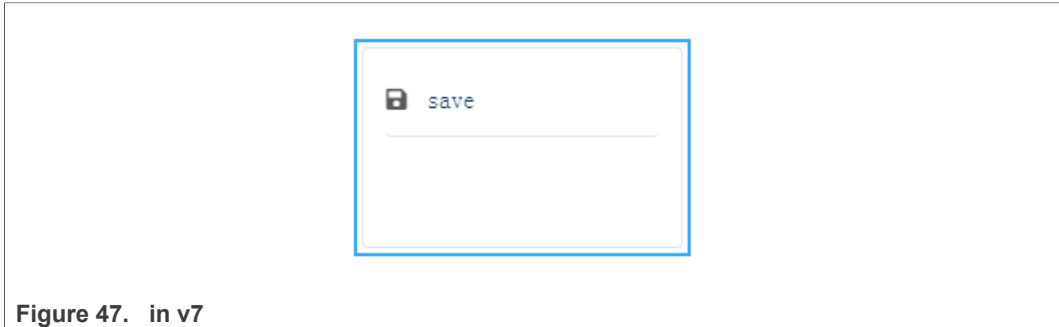


Figure 47. in v7

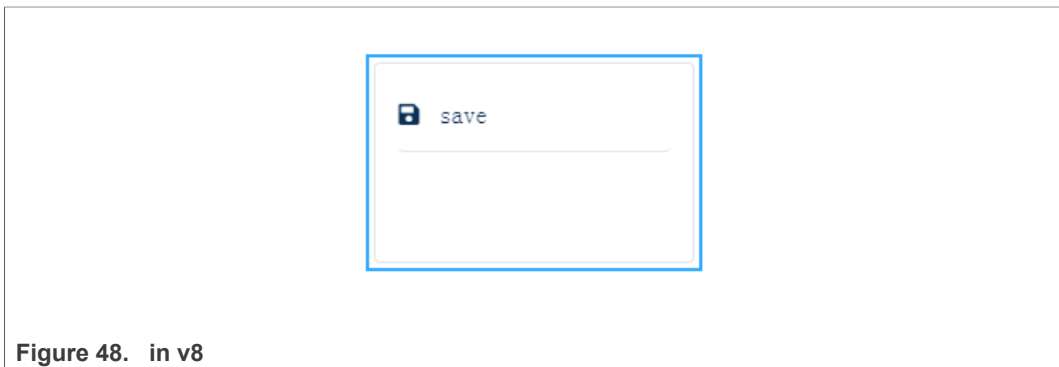


Figure 48. in v8

Table 31. List properties

Property	v7	v8	Description
Symbol	Attribute > items > Symbol	Attribute > items > Symbol	Symbol which will be used as the button icon.
image path	Attribute > items > Image path	Attribute > items > Image path	Image which will be used as the button icon.
Text	Attribute > items > Text	Attribute > items > Text	Text which will be used as the button description.
image size	Attribute > items > image width height	Attribute > items > image width, height	Example:'20, 20'
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Border color	Part and State > Main > Border color	Part and State > Main > Border color	Color of border. It can be set by color picker or input RGB value.
Border width	Part and State > Main > Border width	Part and State > Main > Border width	max:4.
Radius	Part and State > Main > Radius	Part and State > Main > Radius	max:10.

Table 31. List properties...continued

Property	v7	v8	Description
Padding top	Part and State > Main > Padding top	Part and State > Main > Padding top	max:20.
Padding left, right	Part and State > Main > Padding left, right	Part and State > Main > Padding left, right	max:20.
Background color	N/A	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	N/A	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	N/A	Part and State > Main > Background gradient direction	vertical or horizontal.
state	Part and State > Scrollbar > state	Part and State > Scrollbar > state	Style of scroll part. It can be defined by one state or more states.
Disable	Part and State > Scrollbar > Disable	Part and State > Scrollbar > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Scrollbar > Background color	Part and State > Scrollbar > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Scrollbar > Opacity	Part and State > Scrollbar > Opacity	max:255
Background gradient direction	Part and State > Scrollbar > Background gradient direction	Part and State > Scrollbar > Background gradient direction	Vertical or horizontal.
state	Part and State > Buttons > state	Part and State > items > state	Style of list part. It can be defined by one state or more states.
Disable	Part and State > Buttons > Disable	Part and State > items > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	Part and State > Buttons > Text color	Part and State > items > Font color	Text color. It can be set by color picker or input RGB value.
Font family, font size	Part and State > Buttons > Font family, font size	Part and State > items > Font family, font size	Font family and size settings, the size can be a value between 0 and 100.
Background color	Part and State > Buttons > Background color	Part and State > items > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Buttons > Opacity	Part and State > items > Opacity	max: 255
Background gradient direction	Part and State > Buttons > Background gradient direction	Part and State > items > Background gradient direction	Vertical or horizontal.

4.25 Menu

The menu widget can be used to easily create multi-level menus. It handles the traversal between pages automatically.



Figure 49. Menu in v8

Table 32. Menu properties

Property	v8	Description
title	Attribute > title	add the title for widgets.
mode	Attribute > mode	Top fixed, Top unfixed, Bottom fixed.
Root back button	Attribute > Root back button	Enable the root back button.
Enable page title	Attribute > Enable page title	Enable the page title display.
Menu in side	Attribute > Menu in side	Enable the menu in side.
state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
background color	Part and State > Main > background color	Background color of widget. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
state	Part and State > Header > state	Style of main part. It can be defined by one state or more states.

Table 32. Menu properties...continued

Property	v8	Description
Disable	Part and State > Header > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
font color	Part and State > Header > font color	Set the Header font color
font family & size	Part and State > Header > font family & size	Set the Header font family and size
state	Part and State > Header back btn > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Header back btn > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
font color	Part and State > Header back btn > font color	Set the Header back btn font color
font size	Part and State > Header back btn > font size	Set the Header back btn font size
state	Part and State > Sider header > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Sider header > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
font color	Part and State > Sider header > font color	Set the Sider header font color
font family & size	Part and State > Sider header > font family & size	Set the Sider header font family and size
state	Part and State > Sider back btn > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Sider back btn > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
font color	Part and State > Sider back btn > font color	Set the Sider back btn font color
font size	Part and State > Sider back btn > font size	Set the Sider back btn font size
state	Part and State > Page > state	Style of main part. It can be defined by one state or more states.

Table 32. Menu properties...continued

Property	v8	Description
Disable	Part and State > Page > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
background color	Part and State > Page > background color	Background color of widget. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > Page > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Opacity	Part and State > Page > Opacity	Background opacity. The value should be between 0 and 255.
state	Part and State > Sub page > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Sub page > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
background color	Part and State > Sub page > background color	Background color of widget. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > Sub page > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Opacity	Part and State > Sub page > Opacity	Background opacity. The value should be between 0 and 255.
state	Part and State > Btn > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Btn > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
background color	Part and State > Btn > background color	Background color of widget. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > Btn > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Opacity	Part and State > Btn > Opacity	Background opacity. The value should be between 0 and 255.
font color	Part and State > Btn > Font color	Set the Btn font color

4.26 Message box

The message boxes act as pop-ups. They are built from a background [Container](#), a [Label](#), and a [Button matrix](#) for buttons.

The text is broken into multiple lines automatically (has LV_LABEL_LONG_MODE_BREAK) and the height is set automatically to involve the text and the buttons (LV_FIT_TIGHT fit vertically).



Figure 50. Message box in v7

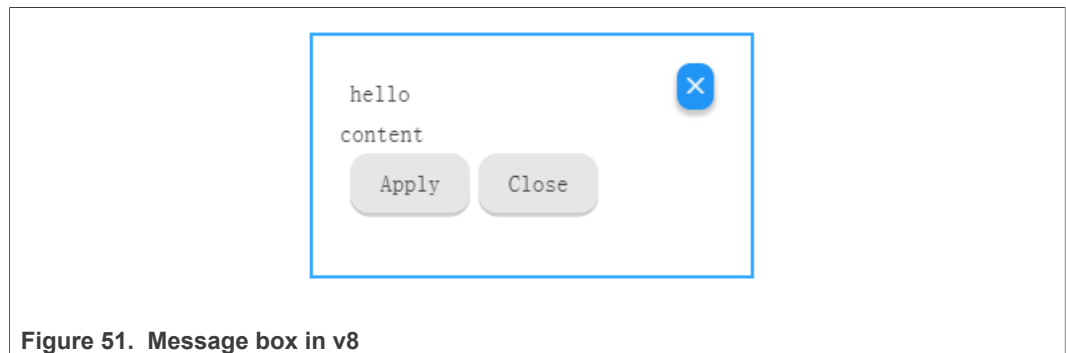


Figure 51. Message box in v8

Table 33. Message box properties

Property	v7	v8	Description
Mbx Button	Attribute > Mbx Button	x	Button label in message box.
Mbox Text	Attribute > Mbox Text	Attribute > Mbox Text	Message box texts
Mbox Title	N/A	Attribute > Mbox Title	Message box title.
Button width, height	N/A	Attribute > Button width, height	Button width, height
Show close btn	N/A	Attribute > Show close btn	The message box can be closed automatically after delay milliseconds with an animation.
state	Part and State > Main > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.

Table 33. Message box properties...continued

Property	v7	v8	Description
Text color	Part and State > Main > Text color	N/A	Text color in main part. It can be set by color picker or input RGB value.
Font family, font size	Part and State > Main > Font family, font size	N/A	Font family and size settings, the size can be a value between 0 and 100.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of main part. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	max: 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Vertical or horizontal.
Border color	Part and State > Main > Border color	Part and State > Main > Border color	Border color.
Border width	Part and State > Main > Border width	Part and State > Main > Border width	v7max: 4, v8max: 1.
Radius	Part and State > Main > Radius	Part and State > Main > Radius	v7max: 20, v8max: 8.
state	Part and State > Button background > state	N/A	Style of button bar part. It can be defined by one state or more states.
Disable	Part and State > Button background > Disable	N/A	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Button background > Background color	N/A	Background color of button bar part. It can be set by color picker or input RGB value.
Opacity	Part and State > Button Bar > Opacity	N/A	max: 255.
Background gradient direction	Part and State > Button background > Background gradient direction	N/A	Vertical or horizontal.
Border color	Part and State > Button background > Border color	N/A	Border color
Border width	Part and State > Button background > Border width	N/A	max: 4.
Radius	Part and State > Button background > Radius	N/A	max: 20.
state	Part and State > Button > state	Part and State > btns > state	Style of button part. It can be defined by one state or more states.

Table 33. Message box properties...continued

Property	v7	v8	Description
Disable	Part and State > Button > Disable	Part and State > btns > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	Part and State > Button > Text color	Part and State > btns > Font color	Text color in button label. It can be set by color picker or input RGB value.
Font family, font size	Part and State > Button > Font family, font size	Part and State > btns > Font family, font size	Font family and size settings in the button label, the size can be a value between 0 and 100.
Background color	Part and State > Button > Background color	Part and State > btns > Background color	Background color of button part. It can be set by color picker or input RGB value.
Opacity	Part and State > Button > Opacity	Part and State > btns > Opacity	max: 255.
Background gradient direction	Part and State > Button > Background gradient direction	Part and State > btns > Background gradient direction	Vertical or horizontal.
Border color	Part and State > Button > Border color	Part and State > btns > Border color	Border color.
Border width	Part and State > Button > Border width	Part and State > btns > Border width	max: 4.
Radius	Part and State > Button > Radius	Part and State > btns > Radius	v7max: 20, v8max: 8.
state	N/A	Part and State > Title > state	Style of title part. It can be defined by one state or more states.
Disable	N/A	Part and State > Title > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	N/A	Part and State > Title > Font color	Font color in title. It can be set by color picker or input RGB value.
Font family, font size	N/A	Part and State > Title > Font family, font size	Font family and size settings in the title, the size can be a value between 0 and 100.
Line space & Letter space	N/A	Part and State > Title > Line space & Letter space	Line space and letter space.
state	N/A	Part and State > Content > state	Style of content part. It can be defined by one state or more states.
Disable	N/A	Part and State > Content > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	N/A	Part and State > Content > Font color	Font color in content. It can be set by color picker or input RGB value.

Table 33. Message box properties...continued

Property	v7	v8	Description
Font family, font size	N/A	Part and State > Content > Font family, font size	Font family and size settings in the content, the size can be a value between 0 and 100.
Line space & Letter space	N/A	Part and State > Content > Line space & Letter space	Line space and letter space.

4.27 Meter

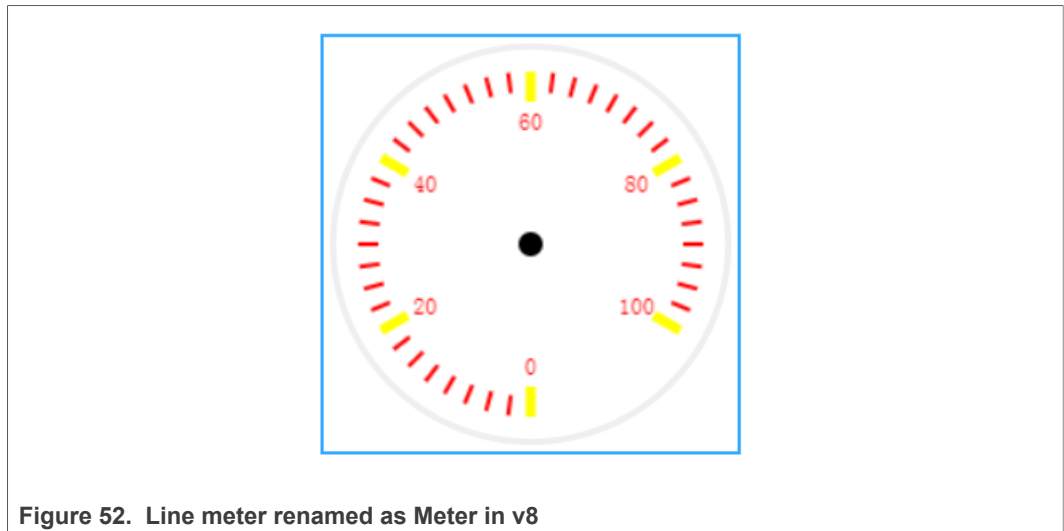


Figure 52. Line meter renamed as Meter in v8

Table 34. Meter properties

Property	v8	Description
Add Dial	Attribute > Add dial	Add multiple dials.
Label gap	Attribute > Label gap	gap between label and radial lines.
Tick count & width	Attribute > Tick count & width	Tick counter and width.
Tick length & Color	Attribute > Tick length & Color	Tick length and color.
Major enable	Attribute > Major enable	Make some "normal" ticks major ticks.
Major index & width	Attribute > Major index & width	major ticket index and width.
Major length& Color	Attribute > Major length & Color	major ticket length and color.
Range enable	Attribute > Range enable	Set the value and angular range of a scale.
Start angle	Attribute > Start angle	Start angles.
Angle range	Attribute > Angle range	Angle range.
Range min & max	Attribute > Range min & max	Range min and max.

Table 34. Meter properties...continued

Property	v8	Description
Needle add	Attribute > Needle add	Add needle
Needle image add	Attribute > Needle image add	Set image as needle background.
Arcs add	Attribute > Arcs add	Add arcs.
Scale Lines add	Attribute > Scale Lines add	Add scale lines.
state	Part and State > Main > state	Style of the main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Background color of main part. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	max: 255.
Background gradient direction	Part and State > Main > Background gradient direction	Vertical or horizontal.
state	Part and State > digit > state	Style of digit part. It can be defined by one state or more states.
Disable	Part and State > digit > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
font color	Part and State > digit > font color	font color in digit part. It can be set by color picker or input RGB value.
font size, font family	Part and State > digit > font size, font family	Font family and size settings in the digit part, the size can be a value between 0 and 100.

4.28 Radio button

The radio button allows user to choose only one of a predefined set of mutually exclusive options.

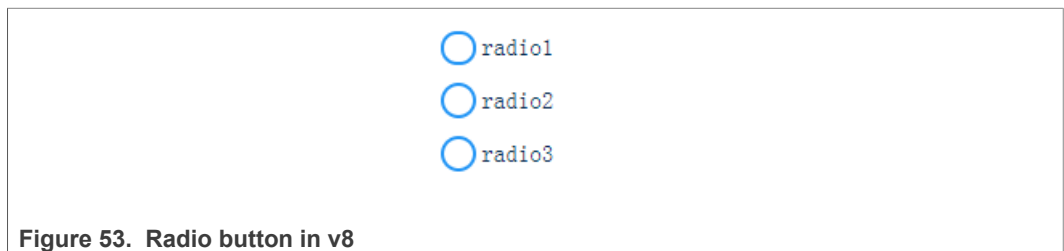


Figure 53. Radio button in v8

Table 35. Radio button properties

Property	v8	Description
item	Attribute > add item	add the item for widgets.
state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.

Table 35. Radio button properties...continued

Property	v8	Description
Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
background color	Part and State > Main > background color	Background color of widget. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
border color	Part and State > Main > border color	Set the border color
border opacity	Part and State > Main > border opacity	set the opacity of the widget border.
border width	Part and State > Main > border width	set the border width
border radius	Part and State > Main > border radius	set the border radius.
padding	Part and State > Main > padding	top, right, bottom. Left.
state	Part and State > Button > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Button > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
background color	Part and State > Button > background color	Button color of widget. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > Button > Background gradient direction	Gradient direction of button color: vertical or horizontal.
Opacity	Part and State > Button > Opacity	Button opacity. The value should be between 0 and 255.
font color	Part and State > Button > font color	Set the button font color
font family & size	Part and State > Button > font family & size	Set the button font family and size
state	Part and State > indicator > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > indicator > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.

Table 35. Radio button properties...continued

Property	v8	Description
background color	Part and State > indicator > background color	indicator color of widget. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > indicator > Background gradient direction	Gradient direction of indicator color: vertical or horizontal.
Opacity	Part and State > indicator > Opacity	indicator opacity. The value should be between 0 and 255.
border color	Part and State > indicator > border color	Set the indicator border color
border opacity	Part and State > indicator > border opacity	Set the indicator border opacity
border width	Part and State > indicator > border width	Set the indicator border radius
border radius	Part and State > indicator > border radius	Set the indicator border radius

4.29 Roller

The roller allows you to select one option from more with scrolling.

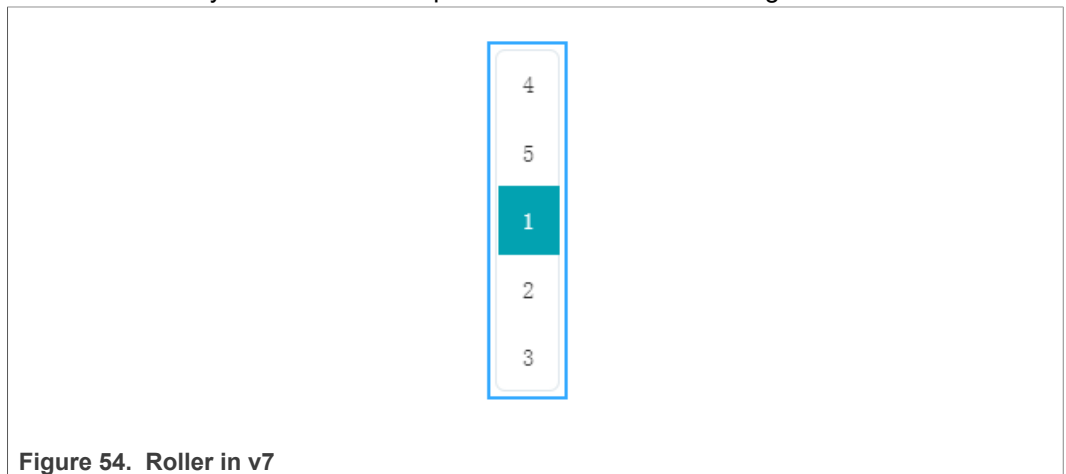


Figure 54. Roller in v7

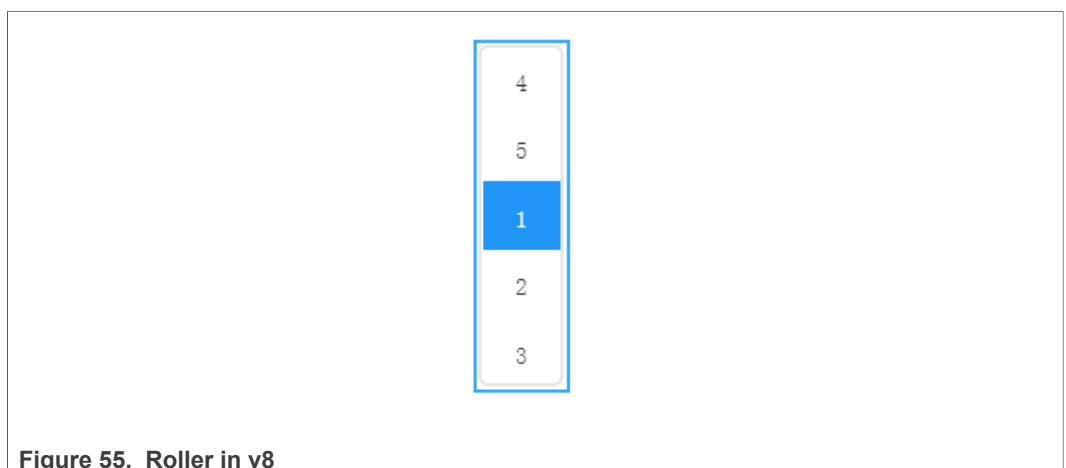


Figure 55. Roller in v8

Table 36. Roller properties

Property	v7	v8	Description
Direction	Attribute > direction	Attribute > direction	Roller mode: Normal mode (roller ends at the end of the options). Infinite mode (roller can be scrolled forever).
Row text	Attribute > Row text	Attribute > Row text	Roller option items. For example, 1,2,3,4,5.
Row	Attribute > Row	Attribute > Row	Roller option count.
state	Part and State > Background > state	Part and State > Main > state	Style of main part. It can be defined by one state or more states.
Disable	Part and State > Background > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Font color	Part and State > Background > Font color	Part and State > Background > Font color	Font color. It can be set by color picker or input RGB value.
Font size	Part and State > Background > Font size	Part and State > Background > Font size	
Font family	Part and State > Background > Font family	Part and State > Background > Font family	
Background color	Part and State > Background > Background color	Part and State > Main > Background color	Background color. It can be set by color picker or input RGB value.
Opacity	Part and State > Background > Opacity	Part and State > Main > Opacity	max: 255.
Background gradient direction	Part and State > Background > Background gradient direction	Part and State > Main > Background gradient direction	Vertical or horizontal.
Border color	Part and State > Background > Border color	Part and State > Main > Border color	Border color.
Border width	Part and State > Background > Border width	Part and State > Main > Border width	max: 2
Radius	Part and State > Background > Radius	Part and State > Main > Radius	Radius.
state	Part and State > Selected > State	Part and State > Selected > state	Style of indicator part. It can be defined by one state or more states.
Disable	Part and State > Selected > Disable	Part and State > Selected > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.

Table 36. Roller properties...continued

Property	v7	v8	Description
Background color	Part and State > Selected > Line color	Part and State > Selected > Line color	Line color.
Opacity	Part and State > Selected > Opacity	Part and State > Selected > Opacity	max: 255
Background gradient direction	Part and State > Selected > Background gradient direction	Part and State > Selected > Background gradient direction	Vertical or horizontal.
Font size & family	Part and State > Selected > Font size & family	Part and State > Selected > Font size & family	

4.30 Slider

The slider object looks like a [Bar](#) supplemented with a knob. The knob can be dragged to set a value. The slider can be vertical or horizontal.

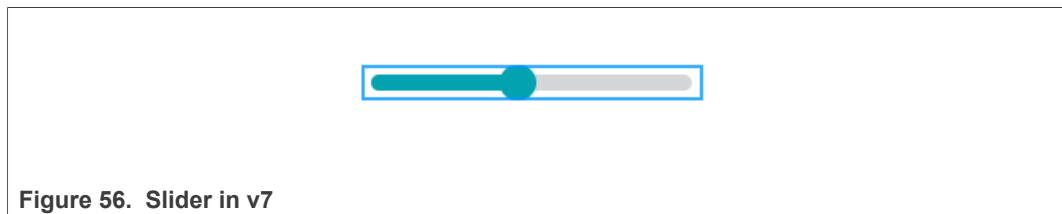


Figure 56. Slider in v7

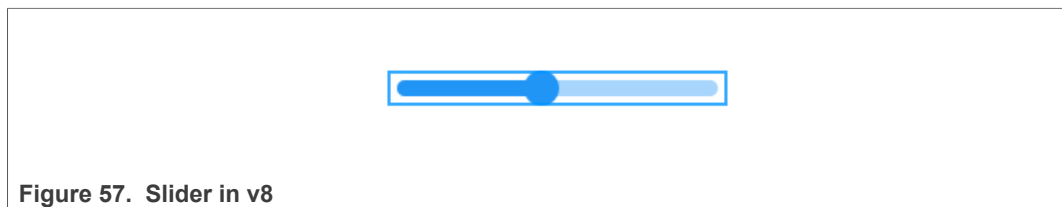


Figure 57. Slider in v8

Table 37. Slider properties

Property	v7	v8	Description
Max& Init Value	Attribute > Max& Init Value	Attribute > Max& Init Value	To set an initial value in special range value(Min:0, Max:100).
state	Part and State > Main > state	Part and State > Main > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.

Table 37. Slider properties...continued

Property	v7	v8	Description
Border color	Part and State > Main > Border color	N/A	Color of border. It can be set by color picker or input RGB value.
Border opacity	Part and State > Main > Border opacity	N/A	Background opacity of head part. The value should be between 0 and 255
Border Radius	Part and State > Main > Border Radius	N/A	Radius of Border: 0-200.
Outline color	N/A	Part and State > Main > Outline color	Color of Outline. It can be set by color picker or input RGB value.
Outline opacity	N/A	Part and State > Main > Outline opacity	Outline opacity. The value should be between 0 and 255.
Outline width	N/A	Part and State > Main > Outline width	Border width of outline. The value can be 1 or 5.
Outline Radius	N/A	Part and State > Main > Outline Radius	Radius of outline: 0-200.
state	Part and State > Indicator > state	Part and State > Indicator > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Indicator > Disable	Part and State > Indicator > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Indicator > Background color	Part and State > Indicator > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Indicator > Opacity	Part and State > Indicator > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Indicator > Background gradient direction	Part and State > Indicator > Background gradient direction	Gradient direction of background color: vertical or horizontal.
state	Part and State > Knob > state	Part and State > Knob > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Knob > Disable	Part and State > Knob > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Knob > Background color	Part and State > Knob > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Knob > Opacity	Part and State > Knob > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Knob > Background gradient direction	Part and State > Knob > Background gradient direction	Gradient direction of background color: vertical or horizontal.

4.31 Spangroup

A spangroup is the object that is used to display rich text. Different from the label object, spangroup can render text styled with different fonts, colors, and sizes into the spangroup object.



Figure 58. Spangroup in v8

Table 38. Spangroup properties

Property	v8	Description
Text	Attribute > Text	The object that is used to display rich text.
Text align	Attribute > Text align	Set the span group to different align mode.(left/right/center/auto).
Mode	Attribute > Mode	Set the span group to different mode.(Fixed/Expand/Break).
items	Attribute > items	Add one new item of Text.
font color	Attribute > font color	Text color in disabled part. It can be set by color picker or input RGB value.
Font family, font size	Attribute > Font family, font size	Font family and size settings in the window content, the size can be a value between 0 and 100.
state	Part and State > Main > state	State of header part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Background color of Symbol part. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Background opacity of Symbol part. The value should be between 0 and 255.

Table 38. Spangroup properties...continued

Property	v8	Description
Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color in Symbol part: vertical or horizontal.
Border color	Part and State > Main > Border color	Border color in ticks part. It can be set by color picker or input RGB value.
Border width	Part and State > Main > Border width	Width of border line: value can be one value from 0 to 1.
padding top, bottom, left, right	Part and State > Main > padding top, bottom, left, right	the padding value of top, bottom, left and right. value can be one value from 0 to 20.

4.32 Spinbox

The spinbox contains a number as text which can be increased or decreased by Keys or API functions. Under the hood, the spinbox is a modified [Text area](#).

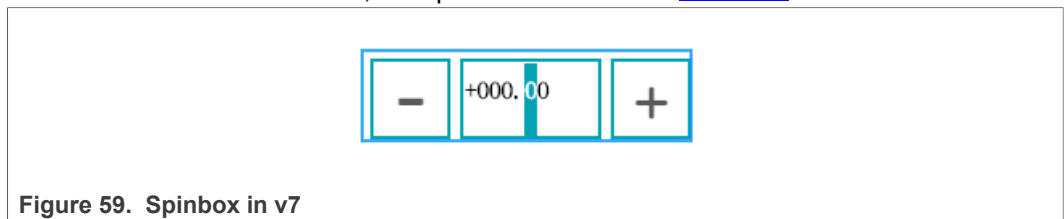


Figure 59. Spinbox in v7

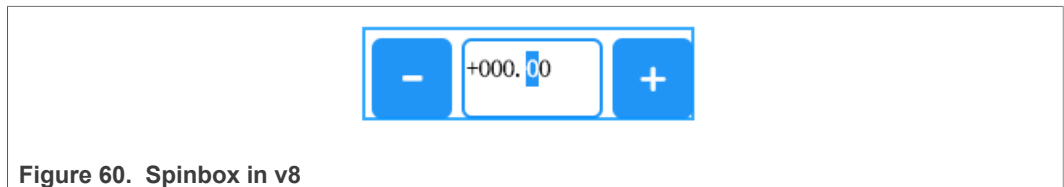


Figure 60. Spinbox in v8

Table 39. Spinbox properties

Property	v7	v8	Description
Digit	Attribute > Digit	Attribute > Digit	Sets the number format.
state	Part and State > Main > state	Part and State > Main > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	Part and State > Main > Text color	Part and State > Main > Font color	Text color in head part. It can be set by color picker or input RGB value.
Font size, font family	Part and State > Main > Font size, font family	Part and State > Main > Font size, font family	Font family and size settings in the calendar header, the size can be a value between 0 and 100.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.

Table 39. Spinbox properties...continued

Property	v7	v8	Description
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Border color	Part and State > Main > Border color	Part and State > Main > Border color	Color of border. It can be set by color picker or input RGB value.
Border width	Part and State > Main > Border width	Part and State > Main > Border width	Border width. The value can be 1 or 5.
Radius	Part and State > Main > Radius	Part and State > Main > Radius	Radius of Border: 0-200
state	Part and State > Cursor > state	Part and State > Cursor > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Cursor > Disable	Part and State > Cursor > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Font size, font family	Part and State > Cursor > Font size, font family	Part and State > Cursor > Font size, font family	Font family and size settings in the calendar header, the size can be a value between 0 and 100.
Background color	Part and State > Cursor > Background color	Part and State > Cursor > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Cursor > Opacity	Part and State > Cursor > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Cursor > Background gradient direction	Part and State > Cursor > Background gradient direction	Gradient direction of background color: vertical or horizontal.
state	Part and State > Buttons > state	Part and State > Button > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Buttons > Disable	Part and State > Button > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Font size, font family	Part and State > Buttons > Font size, font family	Part and State > Button > Font size, font family	Font family and size settings in the calendar header, the size can be a value between 0 and 100.
Background color	Part and State > Buttons > Background color	Part and State > Button > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Buttons > Opacity	Part and State > Button > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Buttons > Background gradient direction	Part and State > Button > Background gradient direction	Gradient direction of background color: vertical or horizontal.

Table 39. Spinbox properties...continued

Property	v7	v8	Description
Border color	Part and State > Buttons > Border color	Part and State > Button > Border color	Color of border. It can be set by color picker or input RGB value.
Border width	Part and State > Buttons > Border width	Part and State > Button > Border width	Border width. The value can be 1 or 5.
Radius	Part and State > Buttons > Radius	Part and State > Button > Radius	Radius of Border: 0-200.

4.33 Spinner

The spinner object is a spinning arc over a border.

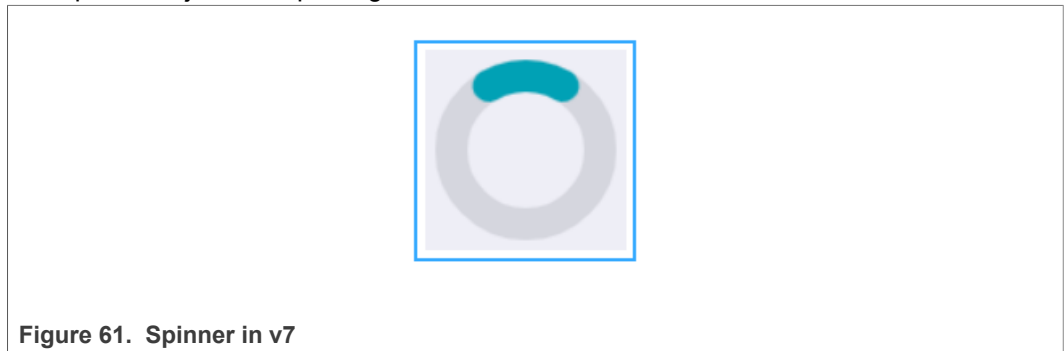


Figure 61. Spinner in v7

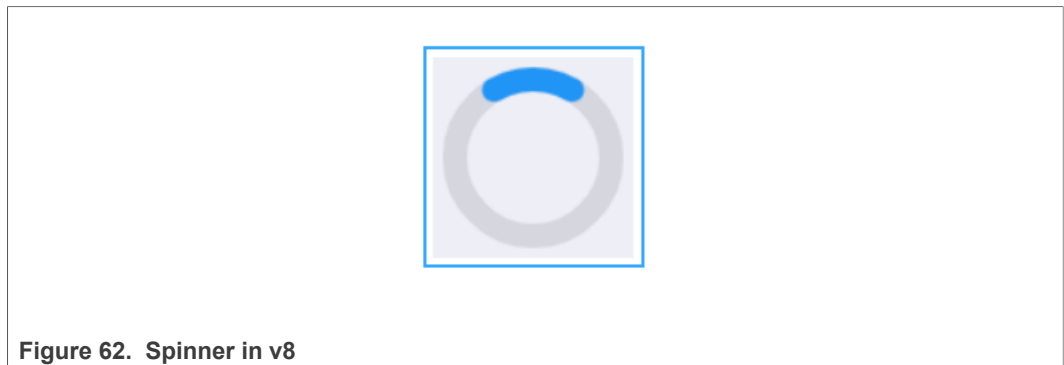


Figure 62. Spinner in v8

Table 40. Spinner properties

Property	v7	v8	Description
Length	Attribute > Length	Attribute > Length	Sets the length of the spinning arc in degrees, the max: 359.
Time	Attribute > Time	Attribute > Time	Sets the spin time in milliseconds.
state	Part and State > Main > state	Part and State > Main > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.

Table 40. Spinner properties...continued

Property	v7	v8	Description
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
padding top, bottom, left, right	Part and State > Main > padding top, bottom, left, right	Part and State > Main > padding top, bottom, left, right	Padding of the scale: 0-10.
Line color	Part and State > Main > Line color	Part and State > Main > Arc color	Color of Line. It can be set by color picker or input RGB value.
Line width	Part and State > Main > Line width	Part and State > Main > Arc width	Line width. The value can be 1 or 20.
Line rounded	Part and State > Main > Line rounded	Part and State > Main > Line rounded	Enable the line rounded.
state	Part and State > indicator > state	Part and State > indicator > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > indicator > Disable	Part and State > indicator > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Line color	Part and State > indicator > Line color	Part and State > indicator > Arc color	Color of Line. It can be set by color picker or input RGB value.
Line width	Part and State > indicator > Line width	Part and State > indicator > Arc width	Line width. The value can be 1 or 20.
Line rounded	Part and State > Main > Line rounded	Part and State > Main > Line rounded	Enable the line rounded.

4.34 Switch

The switch can be used to turn on/off something. It looks like a little slider.



Table 41. Switch properties

Property	v7	v8	Description
Animtime	Attribute > Animtime	N/A	Set the time of animations, when the switch changes state

Table 41. Switch properties...continued

Property	v7	v8	Description
state	Part and State > Main > state	Part and State > Main > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Radius	Part and State > Main > Radius	Part and State > Main > Radius	Radius of Border: 0-200.
state	Part and State > Indicator > state	Part and State > Indicator > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Indicator > Disable	Part and State > Indicator > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Indicator > Background color	Part and State > Indicator > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Indicator > Opacity	Part and State > Indicator > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Indicator > Background gradient direction	Part and State > Indicator > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Radius	Part and State > Indicator > Radius	Part and State > Indicator > Radius	Radius of Border: 0-200
state	Part and State > Knob > state	Part and State > Knob > state	Style of highlight part. It can be defined by one state or more states.
Disable	Part and State > Knob > Disable	Part and State > Knob > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Background color	Part and State > Knob > Background color	Part and State > Knob > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > Knob > Opacity	Part and State > Knob > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Knob > Background gradient direction	Part and State > Knob > Background gradient direction	Gradient direction of background color: vertical or horizontal.

4.35 Table

The tables, as usual, are built from rows, columns, and cells containing texts.

The Table object is lightweight because only the texts are stored. No real objects are created for cells but they are drawn on the fly.



Figure 65. Table in v7

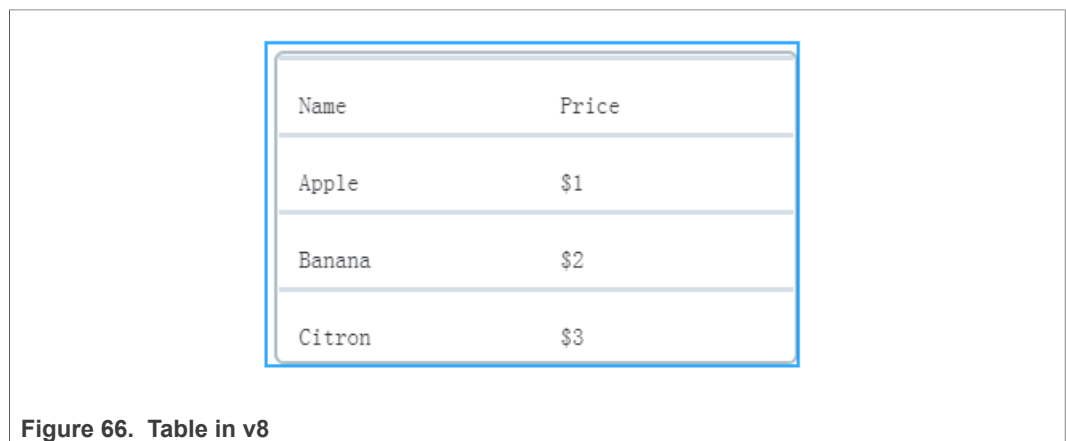


Figure 66. Table in v8

Table 42. Table properties

Property	v7	v8	Description
Column and row	Attribute > Column and row	Attribute > Column and row	Column number and row number of table, they should be one value from 1 to 300.
Column and row content	Attribute > Column and row content	Attribute > Column and row content	Content of column and row. The contents of each row and column are separated by commas.
state	Part and State > main > state	Part and State > main > state	State of main part. It can be defined by one state or more states.
Disable	Part and State > main > Disable	Part and State > main > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Font color	Part and State > main > Font color	N/A	Text color of item. It can be set by color picker or input RGB value.

Table 42. Table properties...continued

Property	v7	v8	Description
Font family & size	Part and State > main > Font family & size	N/A	
Background color	Part and State > main > Background color	Part and State > main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	Part and State > main > Opacity	Part and State > main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > main > Background gradient direction	Part and State > main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
border color	Part and State > main > border color	Part and State > main > border color	Color of border. It can be set by color picker or input RGB value.
border width	Part and State > main > border width	Part and State > main > border width	Width of border line: value can be one value from 0 to 2.
padding top, bottom, left, right	Part and State > main > padding top, bottom, left, right	Part and State > main > padding top, bottom, left, right	the padding value of top, bottom, left and right. value can be one value from 0 to 20.
state	Part and State > items > state	Part and State > items > state	State of items part. It can be defined by one state or more states.
Disable	Part and State > items > Disable	Part and State > items > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
border color	Part and State > items > Border color	Part and State > items > Border color	Color of item border. It can be set by color picker or input RGB value.
Border width	Part and State > items > Border width	Part and State > items > Border width	Width of item border line: value can be one value from 0 to 2.
Background color	N/A	Part and State > items > Background color	Background color of items part. It can be set by color picker or input RGB value.
Opacity	N/A	Part and State > items > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	N/A	Part and State > items > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Font color	N/A	Part and State > items > Font color	Text color of item. It can be set by color picker or input RGB value.
Font family, font size	N/A	Part and State > items > Font family, font size	Font family and size settings of item content, the size can be a value between 0 and 100.

4.36 Tab view

The tab view object is used to organize content in tabs.

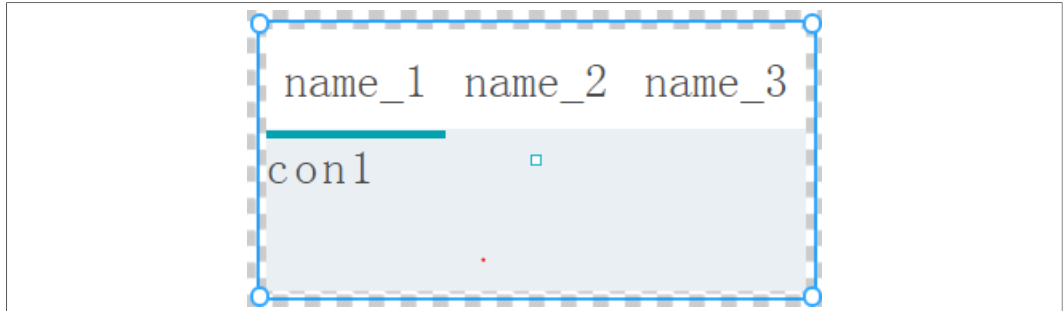


Figure 67. Tab in v7

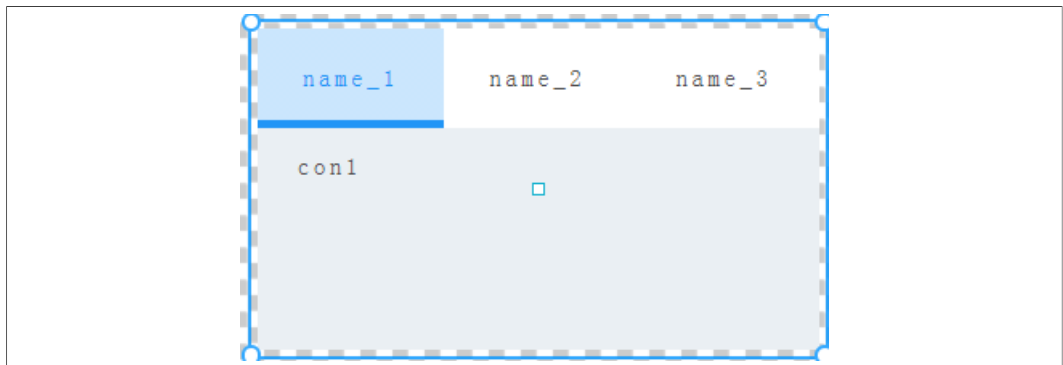


Figure 68. Tab in v8

Table 43. Tab view properties

Property	v7	v8	Description
Animation	Attribute > Animation	N/A	Animation time of tab view when a new tab is loaded, the value should be one value from 0 to 3000.
Contents	Attribute > Contents	Attribute > Contents	the title and content of tab page.
Tab Height	N/A	Attribute > Tab size	the height of Tab title part.
Tab Position	N/A	Attribute > Tab Position	the position of tab. the value can be top, bottom, left and right.
state	Part and State > Main > state	Part and State > Main > state	State of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Text color	Part and State > Main > Text color	Part and State > Main > Text color	Content text color in each tab page. It can be set by color picker or input RGB value.
Font family, font size	Part and State > Main > Font family, font size	Part and State > Main > Font family, font size	Font family and size settings of tab content, the size can be a value between 0 and 100.
Letter spacing	Part and State > Main > Letter spacing	Part and State > Main > Letter spacing	the letter space, the space can be a value between 0 and 6.

Table 43. Tab view properties...continued

Property	v7	v8	Description
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of main part. It can be set by color picker or input RGB value.
Background Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
border color	Part and State > Main > border color	Part and State > Main > border color	Color of border. It can be set by color picker or input RGB value.
border width	Part and State > Main > border width	Part and State > Main > border width	Width of border line: value can be one value from 0 to 5.
border opacity	Part and State > Main > border opacity	Part and State > Main > border opacity	border opacity. The value should be between 0 and 255.
state	Part and State > Indic > state	N/A	State of indic part. It can be defined by one state or more states.
Disable	Part and State > Indic > Disable	N/A	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Background color	Part and State > Indic > Background color	N/A	Background color of Indic part. It can be set by color picker or input RGB value.
Opacity	Part and State > Indic > Opacity	N/A	Indic opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Indic > Background gradient direction	N/A	Gradient direction of Indic background color: vertical or horizontal.
state	Part and State > Tab main > state	Part and State > Tab > state	State of Tab part. It can be defined by one state or more states.
Disable	Part and State > Tab main > Disable	Part and State > Tab > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Background color	Part and State > Tab main > Background color	Part and State > Tab > Background color	Background color of Tab part. It can be set by color picker or input RGB value.
Opacity	Part and State > Tab main > Opacity	Part and State > Tab > Opacity	Tab Background opacity. The value should be between 0 and 255.

Table 43. Tab view properties...continued

Property	v7	v8	Description
Background gradient direction	Part and State > Tab main > Background gradient direction	Part and State > Tab > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Border width	Part and State > Tab main > Border width	Part and State > Tab > Border width	Width of Tab border line: value can be one value from 0 to 5.
border color	Part and State > Tab main > Border color	Part and State > Tab > Border color	Color of border. It can be set by color picker or input RGB value.
Board size	Part and State > Tab main > Board size	Part and State > Tab > Board size	Board width and board radius
Padding	Part and State > Tab main > Padding	Part and State > Tab > Padding	Top, right, left, bottom
state	Part and State > Tab > state	Part and State > items > state	State of Button part. It can be defined by one state or more states.
Disable	Part and State > Tab > Disable	Part and State > items > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Text color	Part and State > Tab > Text color	N/A	text color in Button part. It can be set by color picker or input RGB value.
Letter spacing	Part and State > Tab > Letter spacing	N/A	the letter space, the space can be a value between 0 and 6.
Background color	N/A	Part and State > items > Background color	Background color of Button part. It can be set by color picker or input RGB value.
Background Opacity	N/A	Part and State > items > Opacity	opacity of Button part. The value should be between 0 and 255.
Background gradient direction	N/A	Part and State > items > Background gradient direction	Gradient direction of Button part background color: vertical or horizontal.
border color	N/A	Part and State > items > border color	Color of button border. It can be set by color picker or input RGB value.
border width	N/A	Part and State > items > border width	Width of button border line: The value can be one value from 0 to 5.
border opacity	N/A	Part and State > items > border opacity	border opacity. The value should be between 0 and 255.

4.37 Text area

The text area is a [Page](#) with a [Label](#) and a cursor on it. Texts or characters can be added to it. Long lines are wrapped and when the text becomes long enough the Text area can be scrolled.

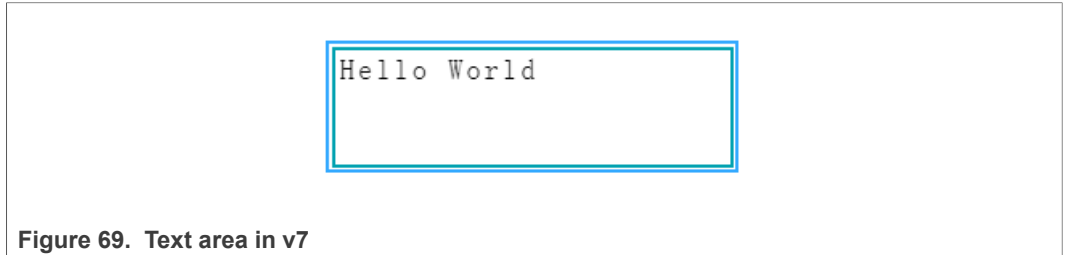


Figure 69. Text area in v7



Figure 70. Text area in v8

Table 44. Text area properties

Property	v7	v8	Description
Text	Attribute > Text	Attribute > Text	Widget text.
Keyboard	Attribute > Keyboard	Attribute > Keyboard	Enable the input keyboard.
Chinese input	N/A	Attribute > Chinese input	Enable the Chinese input.
Chinese library	N/A	Attribute > Chinese library	Full and Mini.
Chinese input font	N/A	Attribute > Chinese input font	
Chinese input font size	N/A	Attribute > Chinese input font size	
state	Part and State > Main > state	Part and State > Main > state	State of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Background color	N/A	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.
Opacity	N/A	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	N/A	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.

Table 44. Text area properties...continued

Property	v7	v8	Description
Font	N/A	Part and State > Main > Align	Set the alignment of the text.
Font color	Part and State > Main > Font color	Part and State > Main > Font color	Text color in main part. It can be set by color picker or input RGB value.
Font family, font size	Part and State > Main > Font family, font size	Part and State > Main > Font family, font size	Font family and size settings in the window content, the size can be a value between 0 and 100.
Letter spacing	Part and State > Main > Letter spacing	Part and State > Main > Letter spacing	the letter space, the space can be a value between 0 and 6.
Border color	Part and State > Main > Border color	Part and State > Main > Border color	Color of border. It can be set by color picker or input RGB value.
Border width	Part and State > Main > Border width	Part and State > Main > Border width	Width of border line: value can be one value from 0 to 5.
Radius	Part and State > Main > Radius	Part and State > Main > Radius	Radius of Border: 0-200.
state	Part and State > scrollbar > state	Part and State > scrollbar > state	State of Scrollable part. It can be defined by one state or more states.
Disable	Part and State > scrollbar > Disable	Part and State > scrollbar > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Background color	Part and State > scrollbar > Background color	Part and State > scrollbar > Background color	Background color of Scrollable part. It can be set by color picker or input RGB value.
Opacity	Part and State > scrollbar > Opacity	Part and State > scrollbar > Opacity	Scrollable opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > scrollbar > Background gradient direction	Part and State > scrollbar > Background gradient direction	Gradient direction of background color: vertical or horizontal.

4.38 Tileview

The Tileview a container object where its elements (called *tiles*) can be arranged in a grid form. By swiping, the user can navigate between the tiles.

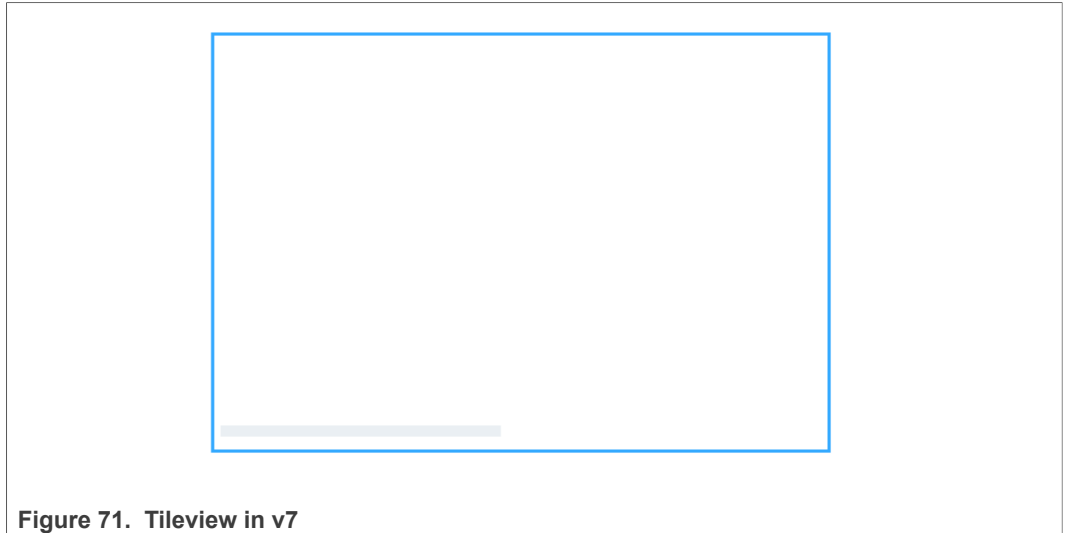


Figure 71. Tileview in v7

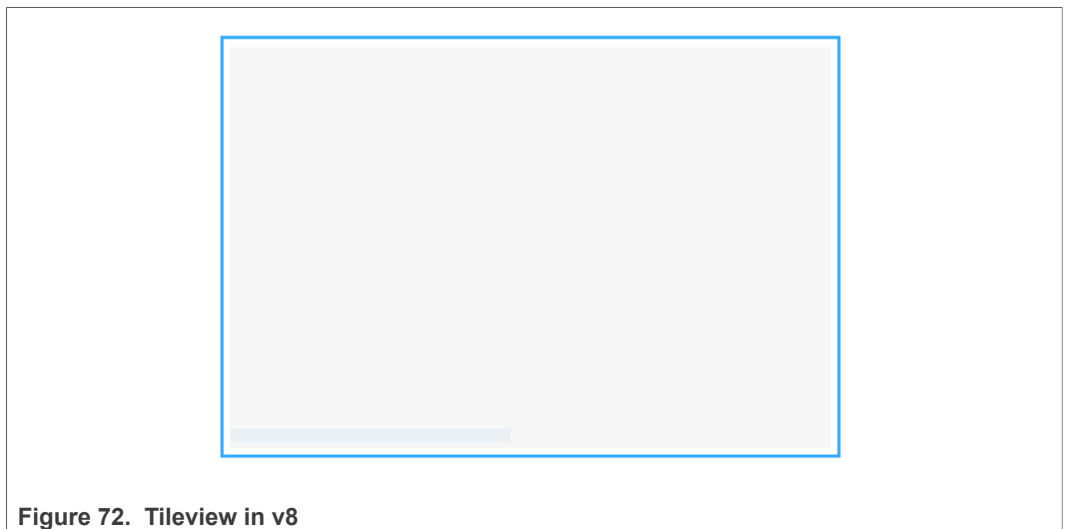


Figure 72. Tileview in v8

Table 45. Tileview properties

Property	v7	v8	Description
Animation	Attribute > Animation	N/A	Animation time of widget when a tile is loaded, the value should be one value from 0 to 3000.
Direction	Attribute > Direction	Attribute > Direction	the direction to change the tile, it can be horizon or vertical.
Page	Attribute > Page, Name	Attribute > Page, Name	add new tile and set tile title.
state	Part and State > Main > state	Part and State > Main > state	State of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.

Table 45. Tileview properties...continued

Property	v7	v8	Description
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Radius	Part and State > Main > Radius	Part and State > Main > Radius	Radius of Border: 0-200.
state	Part and State > Flash > state	N/A	State of Flash part. It can be defined by one state or more states.
Disable	Part and State > Flash > Disable	N/A	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Background color	Part and State > Flash > Background color	N/A	Background color of Flash part. It can be set by color picker or input RGB value.
Opacity	Part and State > Flash > opacity	N/A	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Flash > Background gradient direction	N/A	Gradient direction of background color: vertical or horizontal.
Radius	Part and State > Flash > Radius	N/A	Border Radius of Flash part: 0-200.
state	Part and State > scrollbar > state	Part and State > scrollbar > state	State of Scrollable part. It can be defined by one state or more states.
Disable	Part and State > scrollbar > Disable	Part and State > scrollbar > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Background color	Part and State > scrollbar > Background color	Part and State > scrollbar > Background color	Background color of Scrollable part. It can be set by color picker or input RGB value.
Opacity	Part and State > scrollbar > Opacity	Part and State > scrollbar > Opacity	Background opacity of Scrollable part. The value should be between 0 and 255.
Background gradient direction	Part and State > scrollbar > Background gradient direction	Part and State > scrollbar > Background gradient direction	Gradient direction of background color: vertical or horizontal.

4.39 Window

The window is container-like objects built from a header with a title, a button, and a content area.

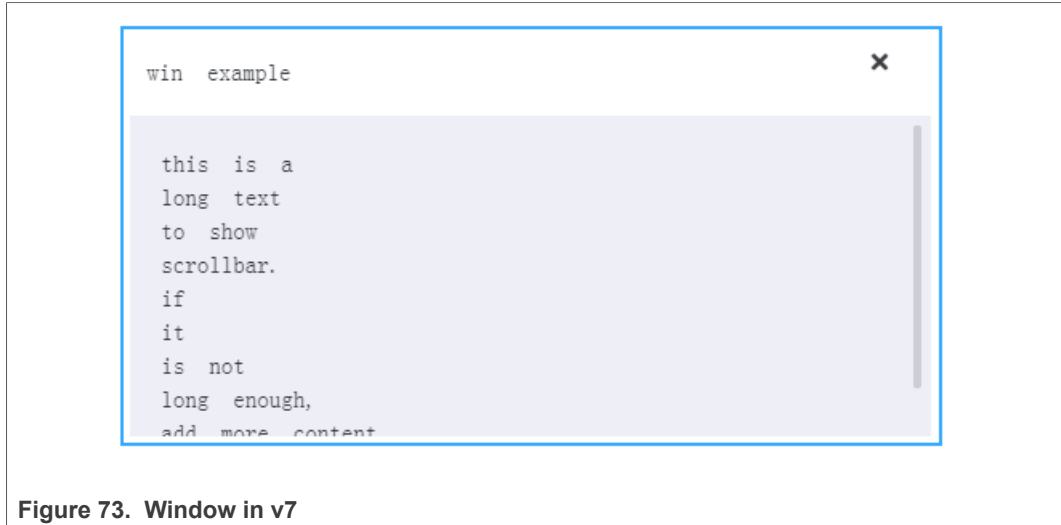


Figure 73. Window in v7

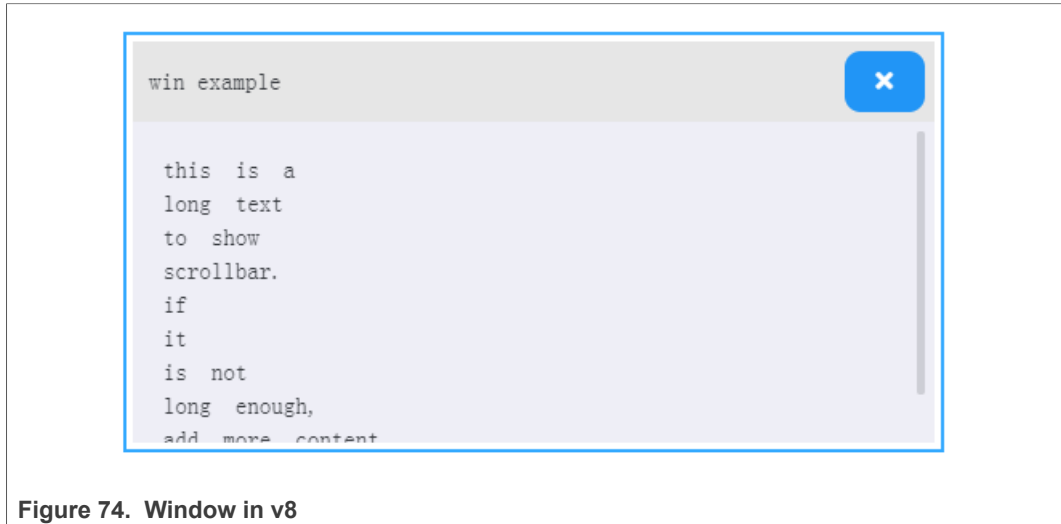


Figure 74. Window in v8

Table 46. Window properties

Property	v7	v8	Description
Head size	N/A	Attribute > Height	Header height.
Title	Attribute > Title	Attribute > Title	The title of window.
Text	Attribute > Text	Attribute > Text	The detailed content text of window.
BTNS	Attribute > Button > image path, image size, symbol	Attribute > Button > image path, image size, button size, symbol	Button size is the button width, image path and image size is the image setting on the button. Symbol defines the symbol on button.
state	Part and State > Main > state	Part and State > Main > state	State of main part. It can be defined by one state or more states.
Disable	Part and State > Main > Disable	Part and State > Main > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Background color	Part and State > Main > Background color	Part and State > Main > Background color	Background color of widget. It can be set by color picker or input RGB value.

Table 46. Window properties...continued

Property	v7	v8	Description
Opacity	Part and State > Main > Opacity	Part and State > Main > Opacity	Background opacity. The value should be between 0 and 255.
Background gradient direction	Part and State > Main > Background gradient direction	Part and State > Main > Background gradient direction	Gradient direction of background color: vertical or horizontal.
Border color	Part and State > Main > Border color	N/A	Color of border. It can be set by color picker or input RGB value.
Border width	Part and State > Main > Border width	N/A	Width of border line: value can be one value from 0 to 12.
state	Part and State > Content > state	Part and State > Content > state	State of content part. It can be defined by one state or more states.
Disable	Part and State > Content > Disable	Part and State > Content > Disable	Enable or disable a state. The custom settings will be invalidated when a state is disabled.
Text color	Part and State > Content > Text color	Part and State > Content > Text color	Text color in content part. It can be set by color picker or input RGB value.
Font size, font family	Part and State > Content > Font size, font family	Part and State > Content > Font size, font family	Font family and size settings in the window content, the size can be a value between 0 and 100.
Background color	Part and State > Content > Background color	Part and State > Content > Background color	Background color of content part. It can be set by color picker or input RGB value.
Opacity	Part and State > Content > opacity	Part and State > Content > opacity	Background opacity of content part. The value should be between 0 and 255.
Background gradient direction	Part and State > Content > Background gradient direction	Part and State > Content > Background gradient direction	Gradient direction of background color in content part: vertical or horizontal.
state	Part and State > Header > state	Part and State > Header > state	State of header part. It can be defined by one state or more states.
Disable	Part and State > Header > Disable	Part and State > Header > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Text color	Part and State > Header > Text color	Part and State > Header > Text color	Text color in header part. It can be set by color picker or input RGB value.
Font size, font family	Part and State > Header > Font size, font family	Part and State > Header > Font size, font family	Font family and size settings in the window content, the size can be a value between 0 and 100.
Background color	Part and State > Header > Background color	Part and State > Header > Background color	Background color of header part. It can be set by color picker or input RGB value.
Opacity	Part and State > Header > opacity	Part and State > Header > opacity	Background opacity of header part. The value should be between 0 and 255.

Table 46. Window properties...continued

Property	v7	v8	Description
Background gradient direction	Part and State > Header > Background gradient direction	Part and State > Header > Background gradient direction	Gradient direction of background color in header part: vertical or horizontal.
state	Part and State > Buttons > state	Part and State > Button > state	State of Symbol part. It can be defined by one state or more states.
Disable	Part and State > Buttons > Disable	Part and State > Button > Disable	Enable or disable a state, the custom settings will be invalidated when a state is disabled.
Opacity	Part and State > Buttons > Opacity	Part and State > Button > Opacity	Background opacity of Symbol part. The value should be between 0 and 255.
Background color	Part and State > Buttons > Background color	Part and State > Button > Background color	Background color of Symbol part. It can be set by color picker or input RGB value.
Background gradient direction	Part and State > Buttons > Background gradient direction	Part and State > Button > Background gradient direction	Gradient direction of background color in Symbol part: vertical or horizontal.

5 Event details

The event details include, event options and support widgets.

- **event options**
 - Source Widget
 - Trigger
 - Target Source
 - Action
 - ... (according to the above action)
- **support widgets**
 1. trigger options
 - a. Clicked
 - b. Pressed
 - c. Released
 - d. Pressing
 - e. Long Pressed
 - f. Long pressed Repeat
 - g. Short Click
 - h. Value changed
 2. action options
 - Background Color
 - Background Gradient Color
 - Background Opacity
 - Width
 - Height
 - Position

- Hide
- C code
- Python code
- Move Animation
- Set Text
- Load Screen

Table 47. Widgets: Available triggers and actions

Widget Name	Available Trigger	Available Action
3Dimage	none	none
Animation Image	none	none
arc	none	none
btnm (button group)	a,b,c,d,e,f,g	all
button	a,b,c,d,e,f,g	all
calendar	none	none
canvas	none	none
chart	none	none
checkbox	h	all
color	none	none
container	none	none
dropdown	h	all
gauge	none	none
image	a,b,c,d,e,f,g	all
imgbtn (image button)	b, c	all
label	none	none
led	none	none
line	none	none
linemeter	none	none
list	none	none
msgbox (message box)	h	all
roller	h	all
slider	h	all
spinbox	b,h	all
spinner	a,d	all
switch	h	all
tab	h	all
table	none	none
textarea	none	none
tileview	none	none
window	none	none

6 LVGL hardware acceleration

LVGL is a software library that fully implements and customizes a Graphical User Interface (drawing, partial screen refresh, input events, and animations). LVGL has software pixel-based draw engine. Several drawing features in LVGL are performed by hardware (HW) accelerators instead of CPU.

To use the CPU time while HW accelerator is running, an RTOS is required to block the LVGL drawing thread and switch to another task, or idle task, where CPU is suspended to save power. The HW accelerators process pixels faster than CPU resulting in a higher frame rendering rate.

GUI Guider can enable and disable the PXP or VGLite accelerator for the devices that support these features.

Note: *It is possible to manually enable or disable the HW accelerator.*

Table 48. LVGL hardware acceleration

Accelerator	i.MX RT1050	i.MX RT1062	i.MX RT1064	i.MX RT1170	i.MX RT1160	i.MX RT595
PXP	√	√	√	√	√	X
VGLite	X	X	X	√	√	√

6.1 PXP enablement

Enable the PXP accelerator in GUI Guider.

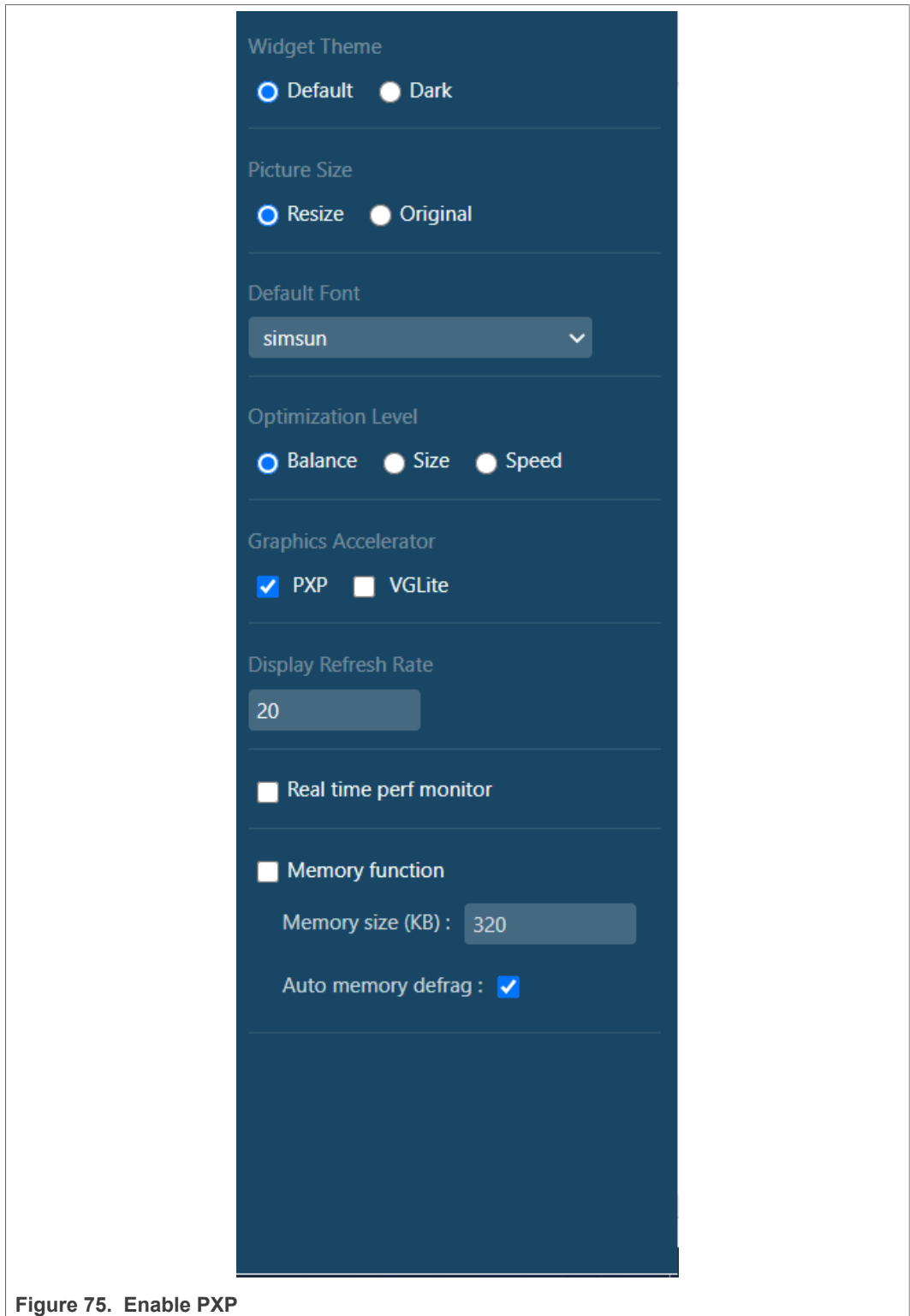


Figure 75. Enable PXP

To enable the PXP accelerator on NXP devices, set the below flag in `lv_conf.h`. This is required as currently only the color format RGB565 (16 bits) is accelerated on NXP devices.

```
#define LV_COLOR_DEPTH 16
```

PXP is a pixel processing HW engine. To check whether PXP is available on your NXP device, see the Reference Manual document or the board configuration.

To enable PXP in LVGL, set the below flags to 1 in `lv_conf.h`.

```
#define LV_USE_GPU 1
#define LV_USE_GPU_NXP_PXP 1
#define LV_USE_GPU_NXP_PXP_AUTO_INIT 1
```

In LVGL, PXP is used to accelerate:

- Area fill + optional transparency
- BLIT (Block Image Transfer) + optional transparency
- Color keying + optional transparency
- Recoloring (color tint) + optional transparency

6.2 VGLite enablement

Enable the VGLite accelerator in GUI Guider.

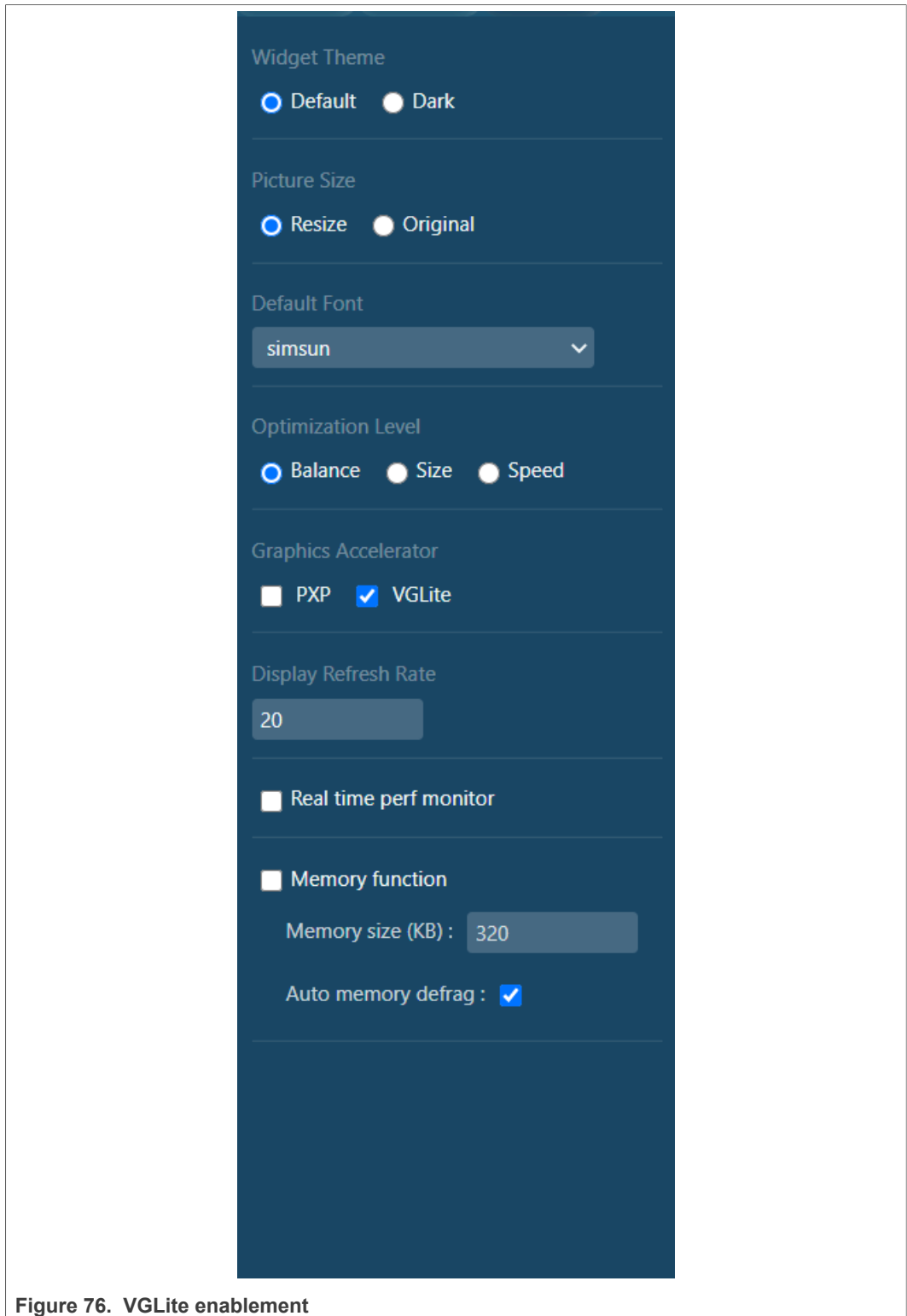


Figure 76. VGLite enablement

To enable the VGLite accelerator on NXP devices, set the below flag in `lv_conf.h`. This is required as currently only the color format RGB565 (16 bits) is accelerated on NXP devices.

```
#define LV_COLOR_DEPTH 16
```

VGLite is an API that uses the Vector/Raster 2D GPU. To check whether 2D GPU is available on your NXP device, see the Reference Manual document or the board configuration.

To enable VGLite in LVGL, set the below flags to 1 in `lv_conf.h`.

```
#define LV_USE_GPU 1
#define LV_USE_GPU_NXP_VG_LITE 1
```

In LVGL, VGLite is used to accelerate:

- Area fill + optional transparency
- BLIT (Block Image Transfer) + optional transparency

6.3 Recommendations to improve acceleration

This section lists general and VGLite recommendations to improve acceleration.

6.3.1 General recommendations

As a rule when a hardware accelerator processes many pixels in a single batch, it provides better performance than processing small number of pixels multiple times.

The reasons are:

1. **Caches:** Pixels previously processed by CPU are loaded in cache, and must be cleaned and invalidated. The operation takes a few cycles.
2. **Setup time:** Each time HW is used to process pixels, the associated driver configures HW registers, This operation also takes a few cycles.

Thus, NXP has defined a threshold for the minimum number of pixels necessary to trig HW acceleration. These thresholds are defined as preprocessor variables.

For PXP, default values are defined in `lv_gpu/lv_gpu_nxp_pxp.h`.

- **LV_GPU_NXP_PXP_BLIT_SIZE_LIMIT:** Size threshold for image BLIT, BLIT with color keying, and BLIT with recolor ($OPA > LV_OPA_MAX$).
- **LV_GPU_NXP_PXP_BLIT_OPA_SIZE_LIMIT:** Size threshold for image BLIT and BLIT with color keying with transparency ($OPA < LV_OPA_MAX$).
- **LV_GPU_NXP_PXP_FILL_SIZE_LIMIT:** Size threshold for fill operation ($OPA > LV_OPA_MAX$).
- **LV_GPU_NXP_PXP_FILL_OPA_SIZE_LIMIT:** Size threshold for fill operation with transparency ($OPA < LV_OPA_MAX$).

For VGLite, default values are defined `lv_gpu/lv_gpu_nxp_vglite.h`.

- **LV_GPU_NXP_VG_LITE_BLIT_SIZE_LIMIT:** Size threshold for image BLIT ($OPA > LV_OPA_MAX$).
- **LV_GPU_NXP_VG_LITE_BLIT_OPA_SIZE_LIMIT:** Size threshold for image BLIT with transparency ($OPA < LV_OPA_MAX$).

- **LV_GPU_NXP_VG_LITE_FILL_SIZE_LIMIT**: Size threshold for fill operation (OPA > LV_OPA_MAX).
- **LV_GPU_NXP_VG_LITE_FILL_OPA_SIZE_LIMIT**: Size threshold for fill operation with transparency (OPA < LV_OPA_MAX).

6.3.2 VGLite recommendations

The 2D GPU behind VGLite has some constraints on the processed buffers:

1. **Address alignment**: Always ensure that the FrameBuffer and pixel buffers are aligned to LV_ATTRIBUTE_MEM_ALIGN_SIZE. You should use the macro LV_ATTRIBUTE_MEM_ALIGN as attribute for statically allocated pixel buffers.
2. **Stride**: Stride is the byte offset between 2 lines of pixels. 2D GPU requires a stride multiple of 16 pixels.

In LVGL: stride = width, so use assets and widgets with a width multiple of 16 pixels.

On platforms like i.MXRT1170 which has both PXP and 2D GPU, prefer 2D GPU as it draws faster than PXP. However, if the GUI contains many pre-rendered semi-transparent images, PXP may be better.

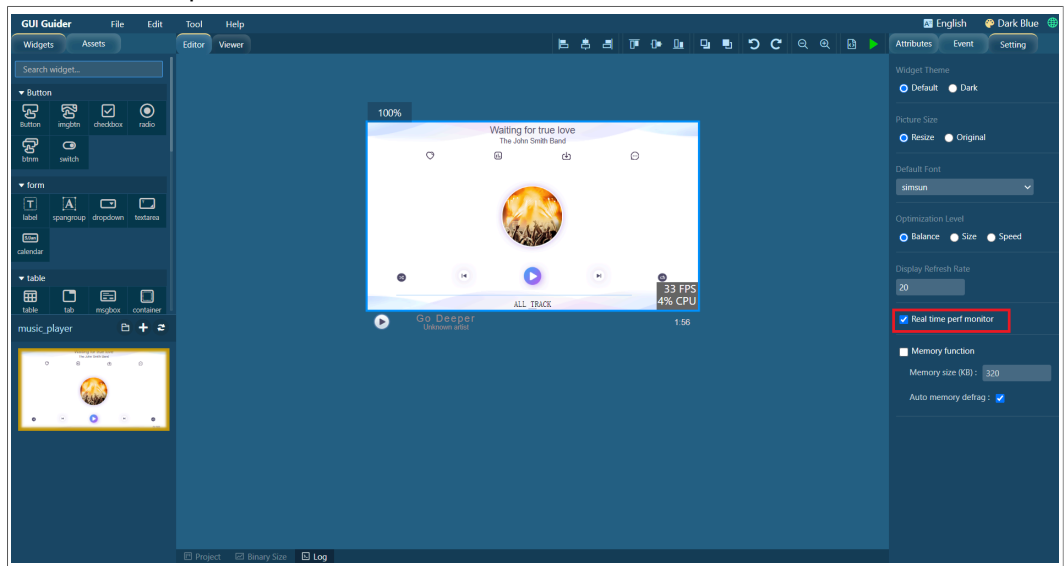
On platforms with only 2D GPU acceleration (VGLite), try to draw widgets rather than using pre-rendered images as widget, as semi-transparent image blitting is not yet accelerated.

7 Performance

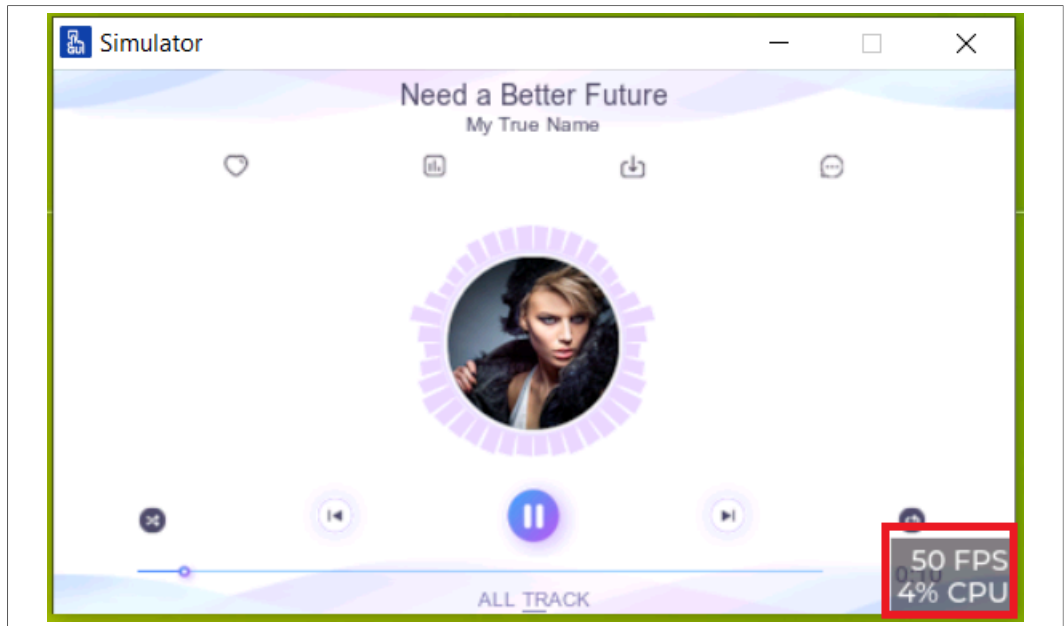
The high graphics performance means a high frame rate (FPS) with required graphical effects. This chapter provides the introduction to enable/disable FPS/CPU usage monitor and the tips on how to improve the graphics performances on NXP MCU devices. i.MX RT595 is used as an example platform for performance optimization.

7.1 Performance monitor enablement

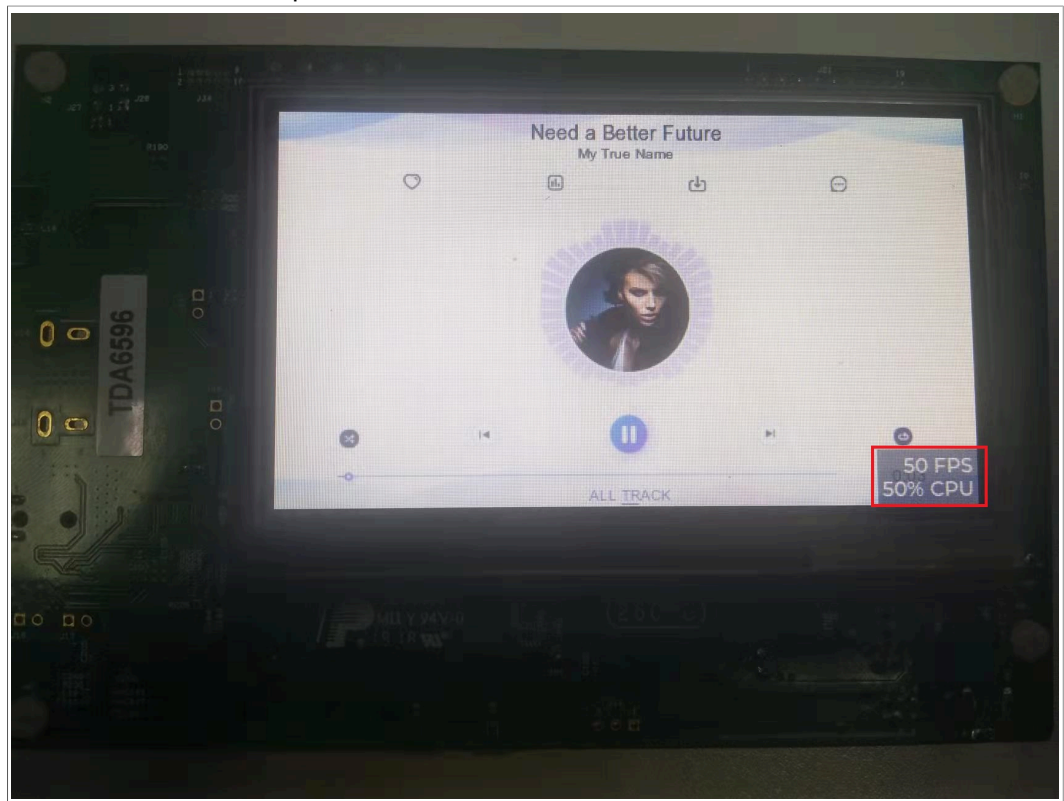
1. Enable the performance monitor in GUI Guider.



2. Check the real-time performance results in simulator.



3. Check the real-time performance results on boards.



7.2 Tips to improve the performance

Here is a summary of tips to get a good FPS performance using lvgl:

- **Use hardware acceleration**

The capability of a board with hardware acceleration (PXP or VGLite) is often higher than a board without. Consider using a board with hardware acceleration. For details, see [Section 6](#).

- **Use Internal SRAM**

The SRAM has better performance than other RAM. If a board has enough SRAM, the SRAM is a preferred place to store the frame buffers and other important data.

- **Use suitable C library**

The Newlib library has good memcpy performance then the NewlibNano library, the Newlib library is a preferred library for applications which have lots of data copy.

- **Use suitable compiler optimization level**

In general, the -O2 and -O3 have better performance than other optimization level. GUI Guider can update the optimization level used in the demo example project, shown in [Figure 77](#).

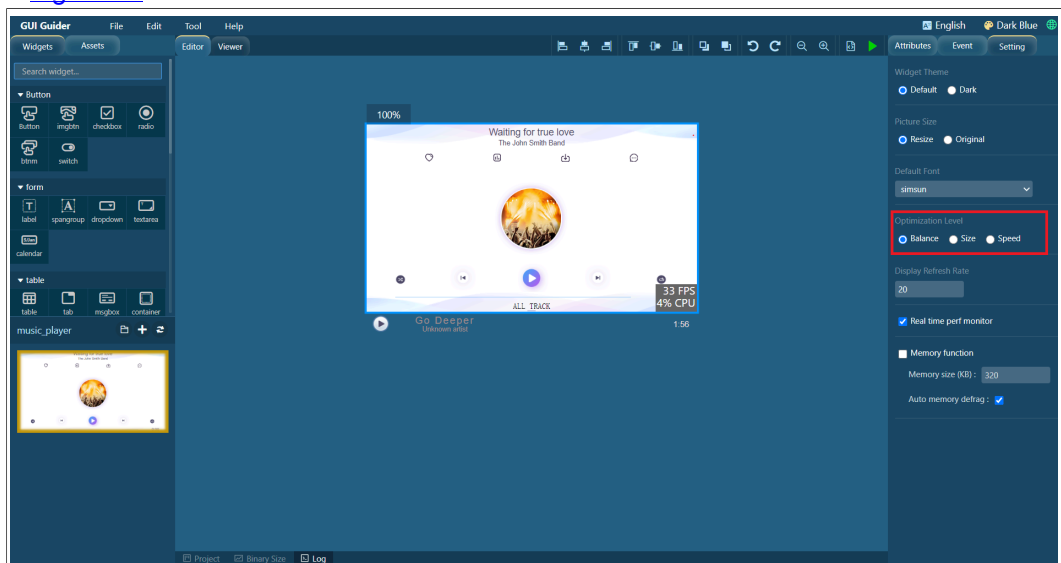


Figure 77. Optimization level

In [Figure 77](#), **Balance** means the -O2 option, **Size** means the -Os option, **Speed** means the -O3 option.

- **Only redraw the changed things**

Make sure that you only invalidate necessary parts of the display.

- **Adjust display refresh period**

The display refresh rate is a hard limit for your frame rate. In general, the frame rate is better when the display refresh period is lower. If the refresh rate of the display is 60 Hz, the refresh period is $1 \text{ s} / 60 = 0.01667 \text{ s} = 16.67 \text{ ms}$. GUI Guider supports updating the refresh period, shown in [Figure 78](#).

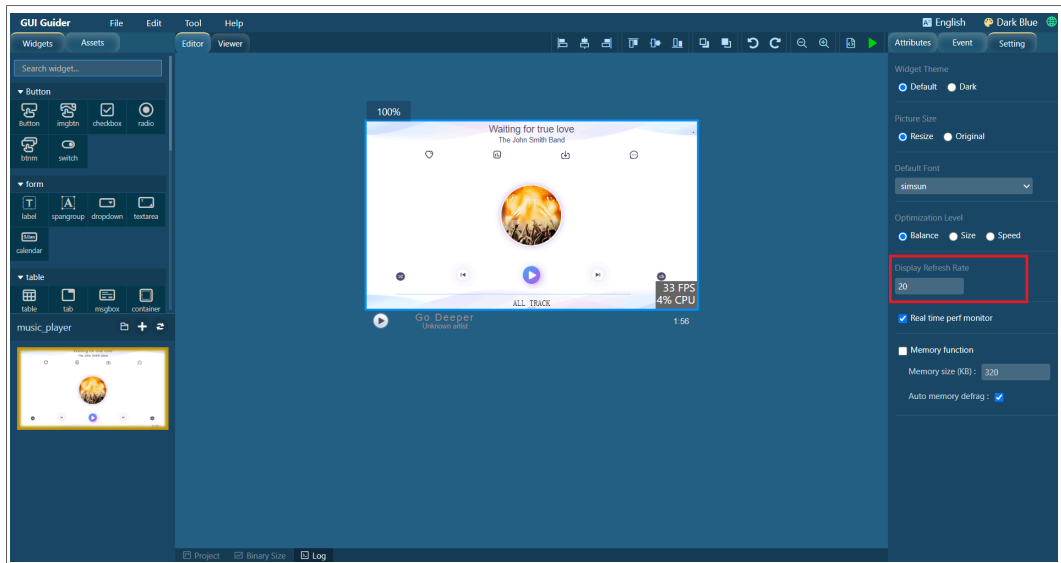


Figure 78. Display refresh rate

7.3 Improve the performance for i.MX RT boards

This section provides information on how to improve the performance on i.MX RT595 when working with MCUXpresso IDE.

7.3.1 Prerequisites

The prerequisites are:

Design a GUI application using the GUI Guider and port the generated LVGL C source file to the template project imported by MCUXpresso IDE.

7.3.2 Improve the performance

1. Update the MCUXpresso setting to use the Release build configuration, -O2 optimization level, and Newlib library. For details, see the MCUXpresso IDE documentation.
2. Update the following line in source/lv_conf.h to change the display refresh period.

```
#define LV_DISP_DEF_REFR_PERIOD 30 /* [ms] */
```

For example, if the refresh rate of the display is 60 Hz, the value can be set to 16.67.

3. Enable the hardware VGLite acceleration by changing the following line in source/lv_conf.h.

```
#define LV_USE_GPU_NXP_VG_LITE 0 // change to 1 to enable VGLite.
```

4. If the NXP "G1120B0MIPI" MIPI Circular Display is selected, the frame buffer can be placed in SRAM. You can updated the following lines in board/display_support.h:

```
#define DEMO_BUFFER0_ADDR 0x28000000U // i.e. Change to 0x20000000U
#define DEMO_BUFFER1_ADDR 0x28200000U //i.e. Change to 0x20100000U
```

- If the NXP "G1120B0MIPI" MIPI Circular Display is selected and few images are used. The image arrays can also be placed in the SRAM. To place the image array in SRAM, you can add the following macro definition in source/lv_conf.h first.

```
#define LV_ATTRIBUTE_IMG_CONST
__attribute__((section("DataQuickAccess")))
Then updated the C array definition in the Image C source
files to add above macro:
const LV_ATTRIBUTE_IMG_CONST LV_ATTRIBUTE_MEM_ALIGN
LV_ATTRIBUTE_LARGE_CONST LV_ATTRIBUTE_IMG_XXXXXXX uint8_t
XXXXXXXXXXXXXXXXX_map[] = { ... },
LV_ATTRIBUTE_IMG_CONST const lv_img_dsc_t XXXXXXXXXXXXXXXXXXXX
= { ... },
```

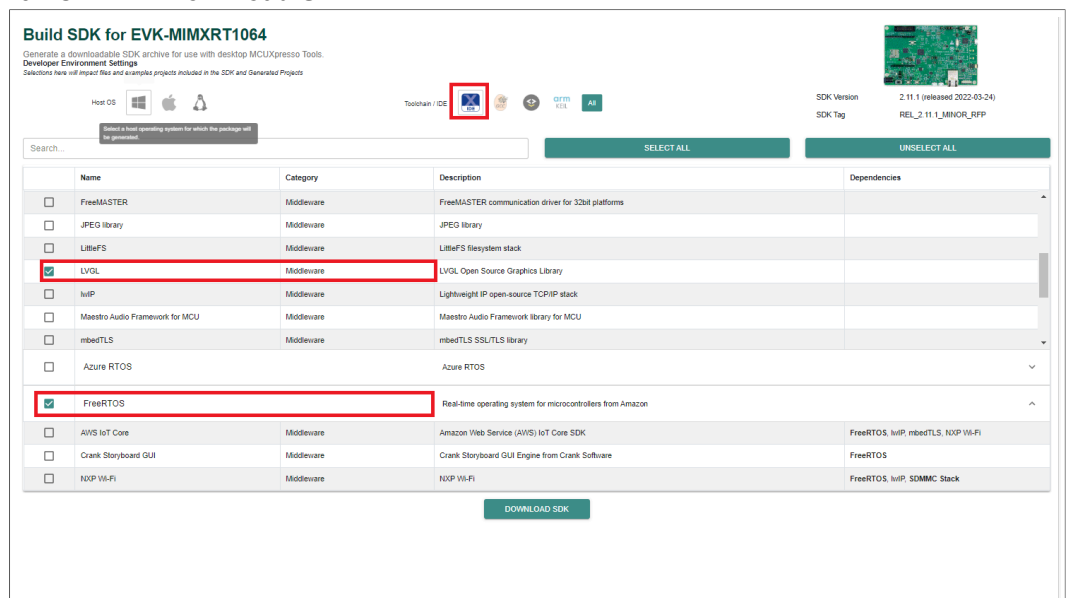
8 Debug GUI Guider project

MCUXpresso IDE, Keil MDK, and IAR are integrated in GUI Guider which makes it easy to debug GUI application on NXP MCU devices.

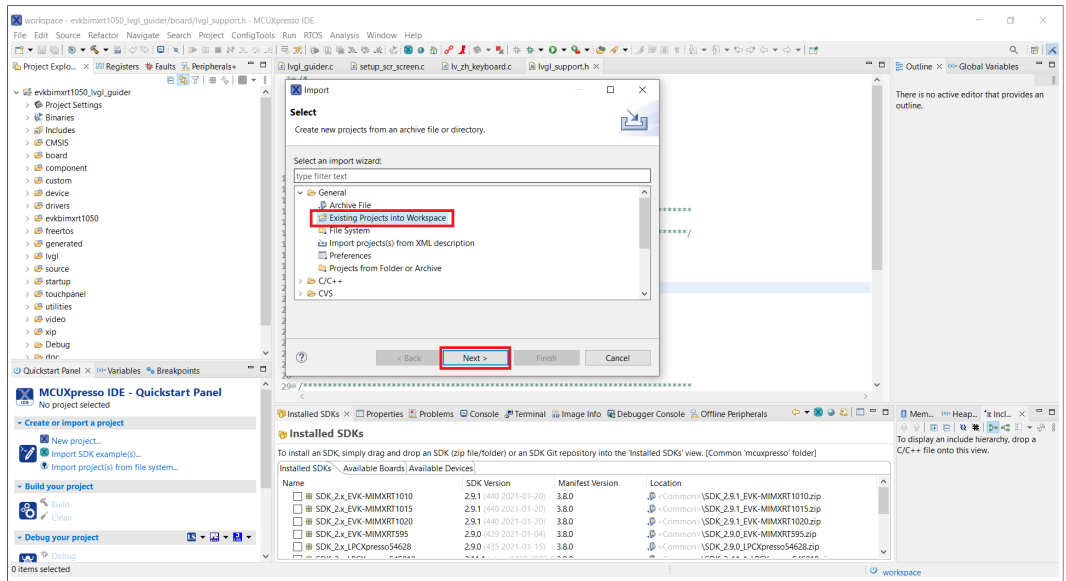
8.1 MCUXpresso

To debug the GUI Guider project on MCUXpresso, perform the following steps:

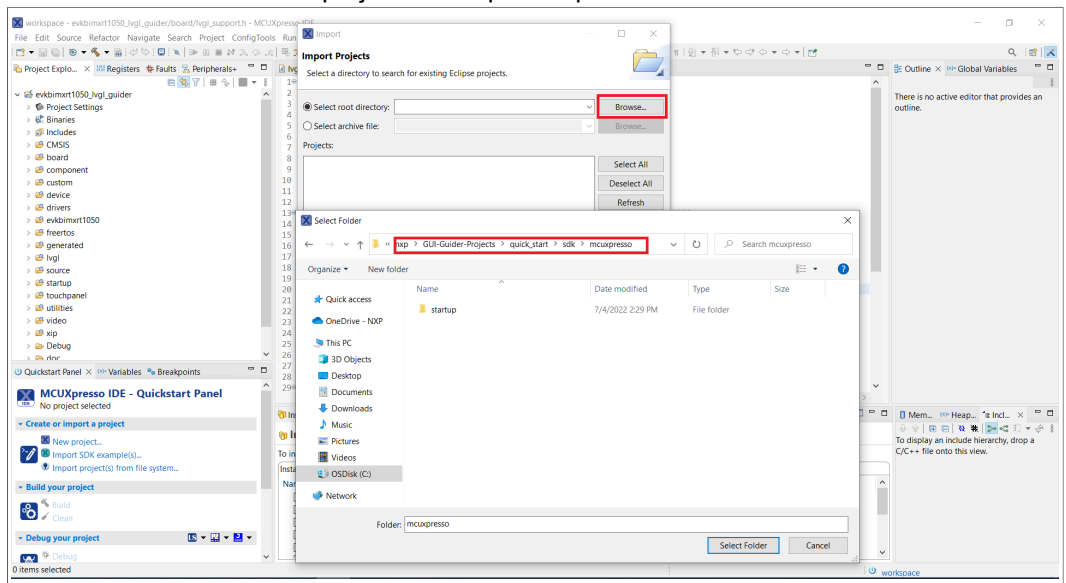
- Open the link <https://mcuxpresso.nxp.com/en/select>.
- Select the development board. For example, EVK-MIMXRT1064.
- Click the **Build MCUXpresso SDK** button.
- Select the two middleware LVGL and FreeRTOS from the **Build SDK for <target>** page.
- Make sure to select the MCUXpresso (toolchain).
- Click the **Download SDK** button.



- Import the downloaded SDK into the IDE.
- Click **File > import > General**.

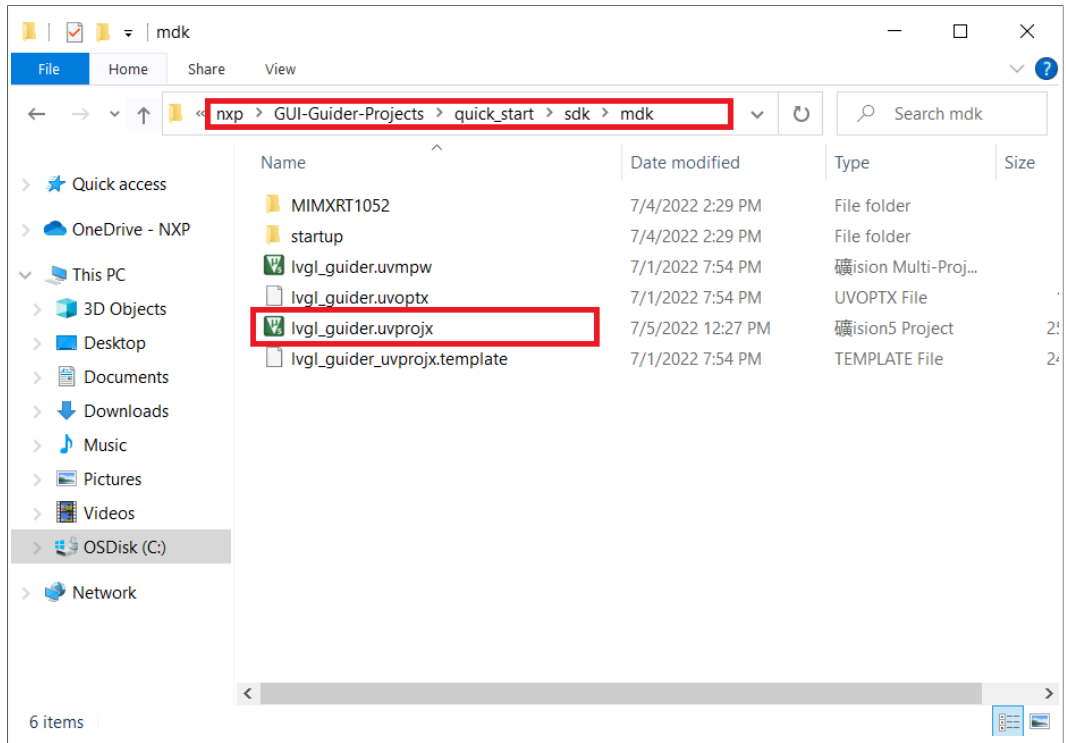


9. Select the GUI Guider project MCUXpresso path.



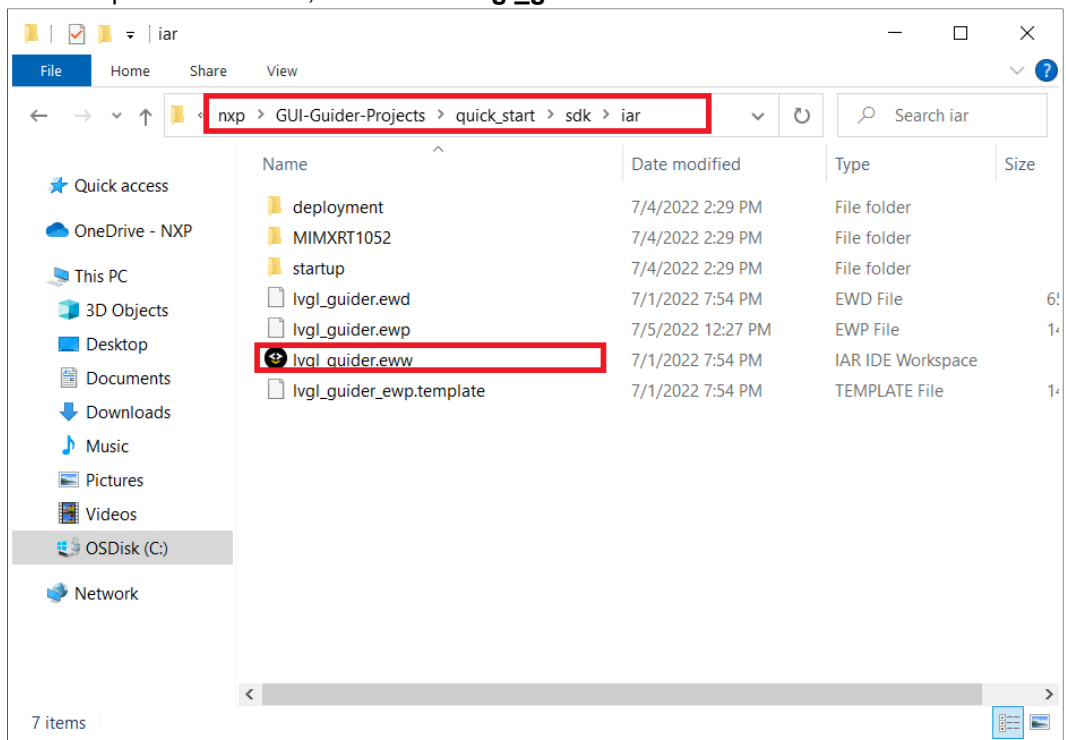
8.2 Keil MDK

Find the path named “mdk”, double click **lvgl_guider.uvprojx**.



8.3 IAR

Find the path named “iar”, double click **lvgl_guider.eww**.



9 MicroPython

[MicroPython](#) is a lean and efficient implementation of the [Python 3](#) programming language. MicroPython includes a small subset of the Python standard library and is optimized to run on microcontrollers and in constrained environments.

9.1 Using LVGL in MicroPython

By building LVGL as a MicroPython module, user can have a high-level GUI library for fast prototyping GUI, taking advantage of Python's language features such as *Inheritance*, *Closures*, *List Comprehension*, *Generators*, *Exception Handling*, *Arbitrary Precision Integers*, and others.

9.1.1 Advantages

- Develop GUI in Python, a very popular high-level language.
- Use paradigms such as Object-Oriented Programming.
- Usually, GUI development requires multiple iterations to get things right. With C, each iteration consists of **Change code > Build > Flash > Run**. In MicroPython it is just **Change code > Run**.

9.2 MicroPython in GUI Guider

GUI Guider ships prebuilt MicroPython binaries by default. For more information on how to build, see [lv_MicroPython README](#).

9.2.1 Generate code

When the **Generate code** button on GUI Guider UI is clicked, the code for both C and MicroPython is generated under the folder '*<GUI-Guider-Project-name>/generated*'. The MicroPython file **gui_guider.py** available in the UI.

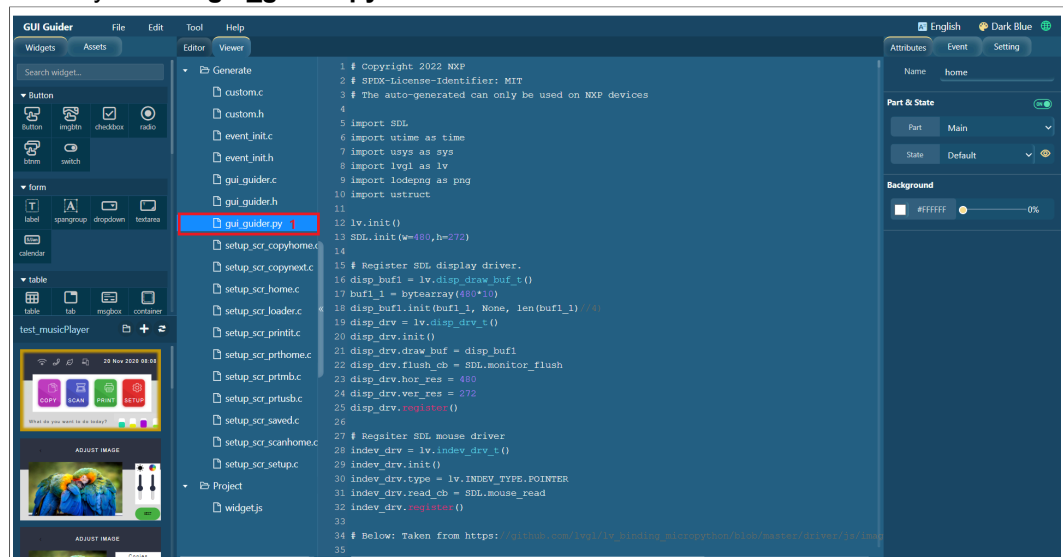


Figure 79. View MicroPython code

9.2.2 Run simulator

Click the **Run simulator > MicroPython** button. The GUI Guider generates code and launches the simulator in a separate window.

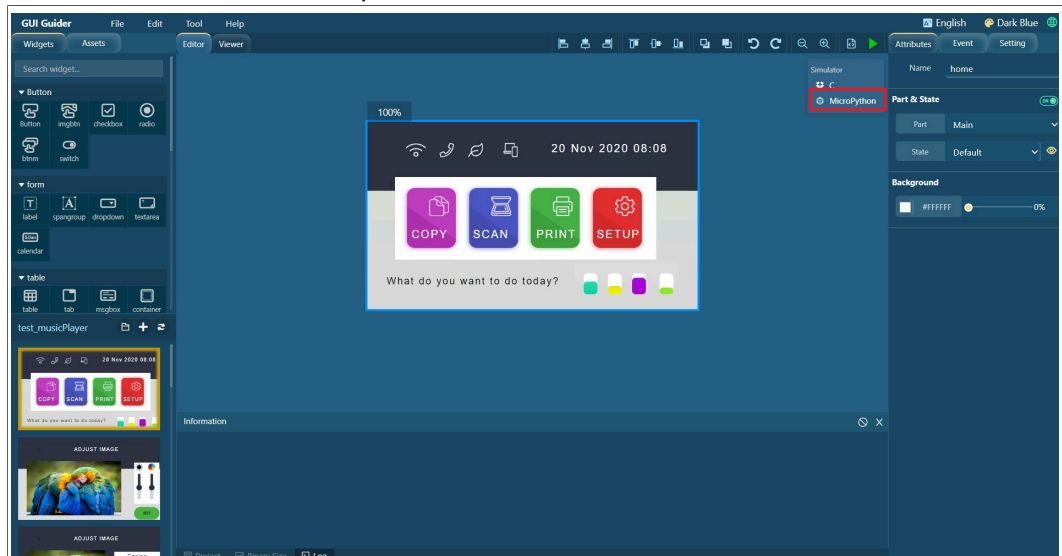


Figure 80. Run simulator

9.2.3 Add custom code

Like C, GUI Guider supports adding custom Python code, either as event action, or as independent 'custom.py' file under the folder 'custom'.

Note: *Indentation is a very important concept of Python because without proper indenting the code, IndentationError appears and the code is not compiled. To avoid this, GUI Guider follows the below assumptions during the code generation:*

- Each line of a block is indented with four spaces.
- Tab is replaced with four spaces automatically.

9.2.3.1 As Event action

[Table 49](#) provides a description of the custom Python code options.

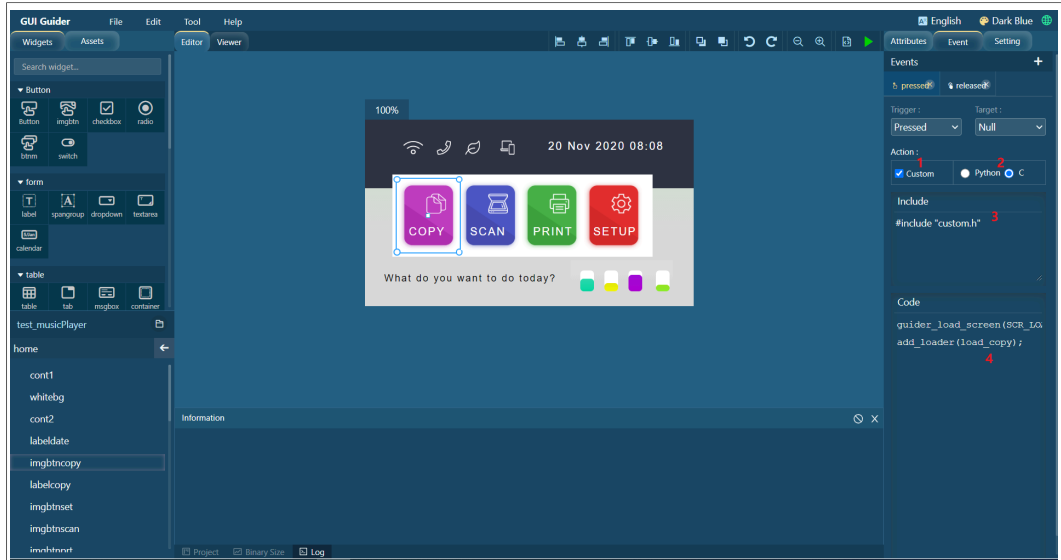


Figure 81. Python code options

Table 49. Custom Python code options

Label	Description
1	Event Type: Customer code
2	Event Code Type: Python code
3	Global variable or function
4	Codes that are wrapped in event callback

9.2.3.2 As custom.py

Put the custom.py file into the folder '*<GUI-Guider-Project-name>/custom/*'. The content appears merged into the final **gui_guider.py** file, replacing the tab with four spaces.

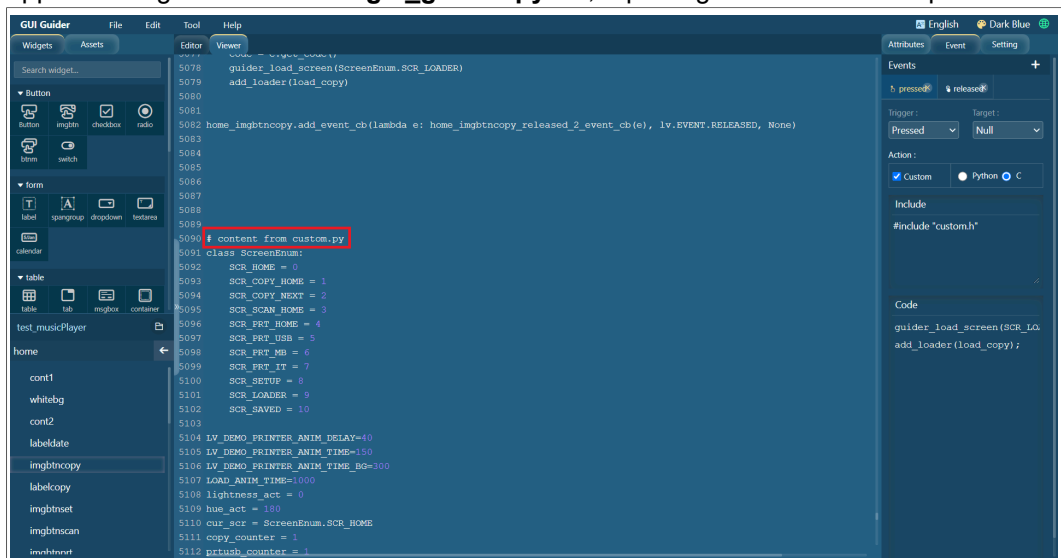


Figure 82. Content appears merged into the final gui_guider.py file

9.2.4 Limitations

- Only LVGL v8 is supported.
- Only limited fonts are built in. See [Built-in fonts](#) in LVGL.
- Compared to C, MicroPython runs slower. Due to this, some animations are not added in Music player demo.

10 Porting RTOS

This section lists the steps to port GUI APP to RTOS (Real-Time Operating System).

10.1 RT-Thread

To port the LVGL C source file generated by GUI Guider to the RT-Thread project, see the following sections.

10.1.1 Prerequisite

The following are the prerequisites:

- Keil v5.35 or newer
- GUI Guider v1.4.0 GA
- Connect i.MX RT1060 to the host with a USB cable.

Note: In the working environment, all paths are not allowed to have Chinese characters or spaces.

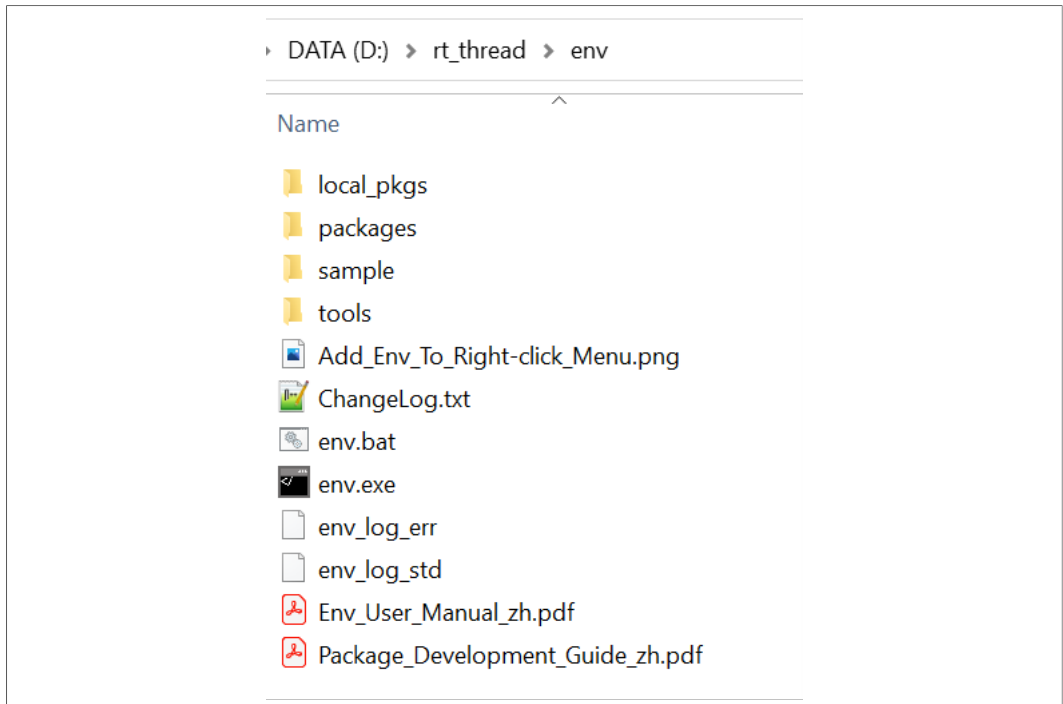
10.1.2 Install Git

Git supports the software package management. Download Git from <https://git-scm.com/downloads>. Install and add the install path into the system environment variable PATH.

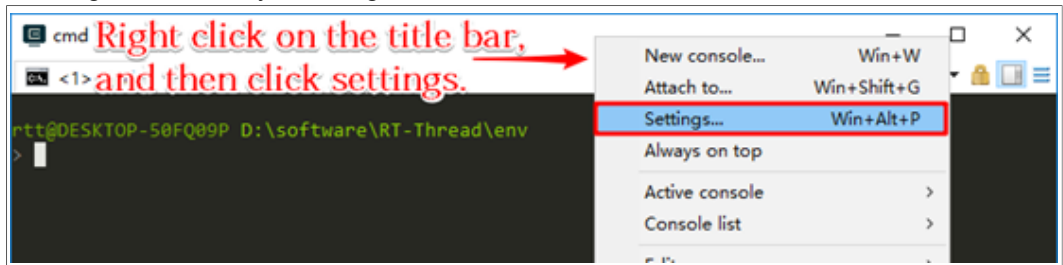
10.1.3 Configure the Env tool

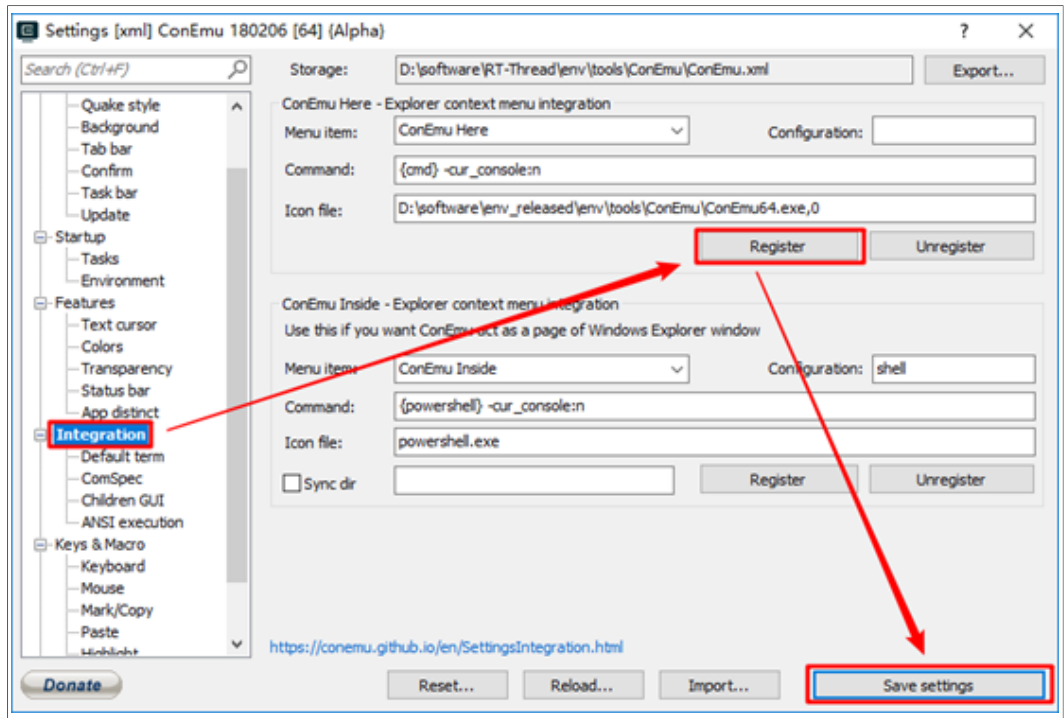
To configure the Env tool:

1. Download the Env tool: [env_released_1.2.0.7z](#).
2. Extract the file env_released_1.2.0.7z to a local folder. For example, D:\rt-thread\.



3. In the env directory (D:\rt-thread\env), run `env.exe`. If it fails to open, you can try to use `env.bat`.
4. Register env utility in the right-click menu.

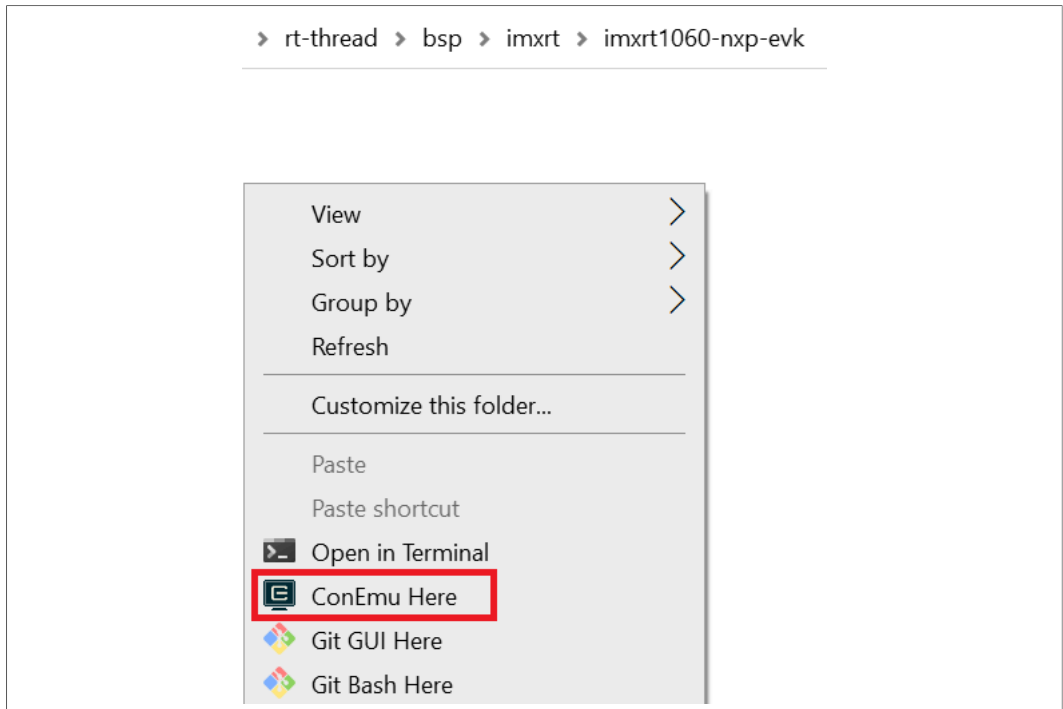




10.1.4 Download RT-Thread and apply patches

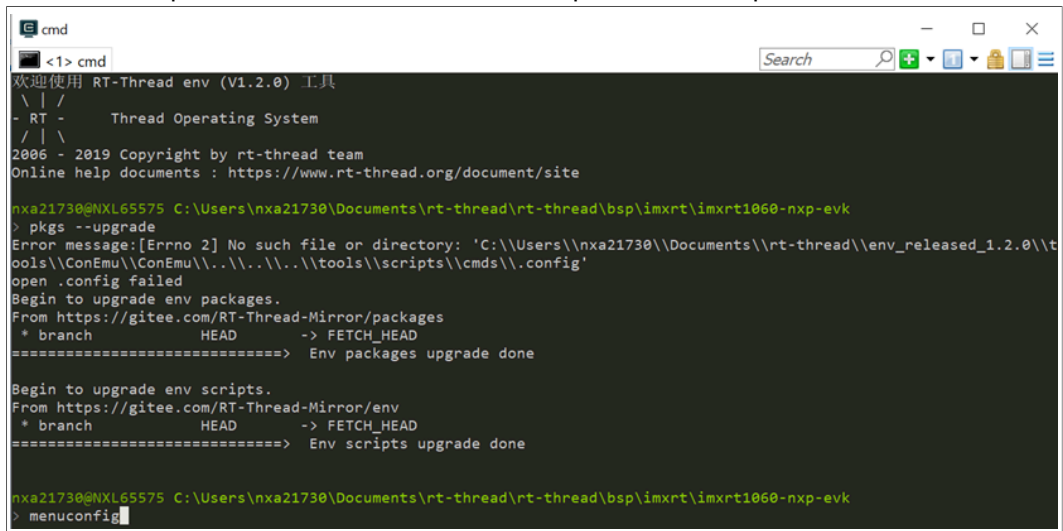
To download RT-Thread:

1. Go to the root folder of RT-thread. For example, D:\rt-thread\.
2. Run Git clone <https://github.com/RT-Thread/rt-thread.git> to download RT-thread source code.
3. Go to the i.mxrt1060 bsp folder D:\rt-thead\rt-thread\bsp\imxrt\imxrt1060-nxp-evk. Right-click the window and select "ConEmu here" to open env console.



4. In Env console, run `pkgs --upgrade` to update env packages and scripts.

- Env packages location: `<Env tool installation path>\packages\packages\`
- Env scripts location: `<Env tool installation path>\tools\scripts\`

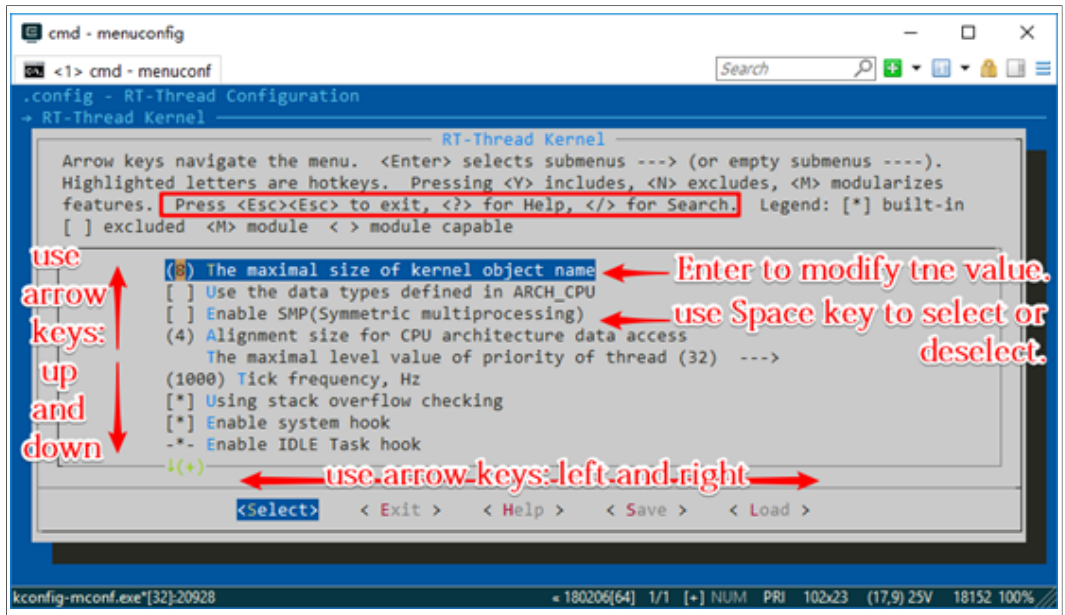


Note: If "SSL certificate problem: unable to get local issuer certificate" is displayed as an error message, then run "git config --global http.sslVerify false".

10.1.5 Enable GUI demo project in RT-Thread

To enable GUI demo project:

1. In env console, go to the imxrt1060 bsp folder `D:\rt-thead\rt-thread\bsp\imxrt\imxrt1060-nxp-evk\` and run `menuconfig` to open config UI.

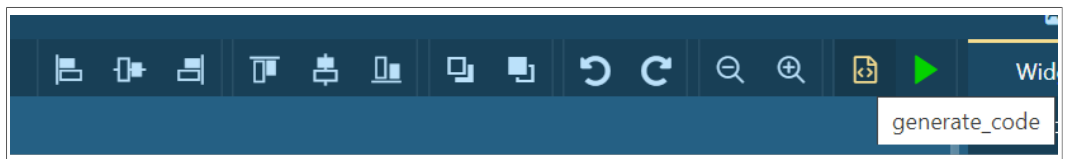


2. Enable LVGL GUI Guider support.
Location:
 - Hardware Drivers Config
 - Onboard Peripheral Drivers
 - Enable LVGL for LCD
 - Support NXP GUI Guider
- To download the selected packages, run `pkgs --update`.

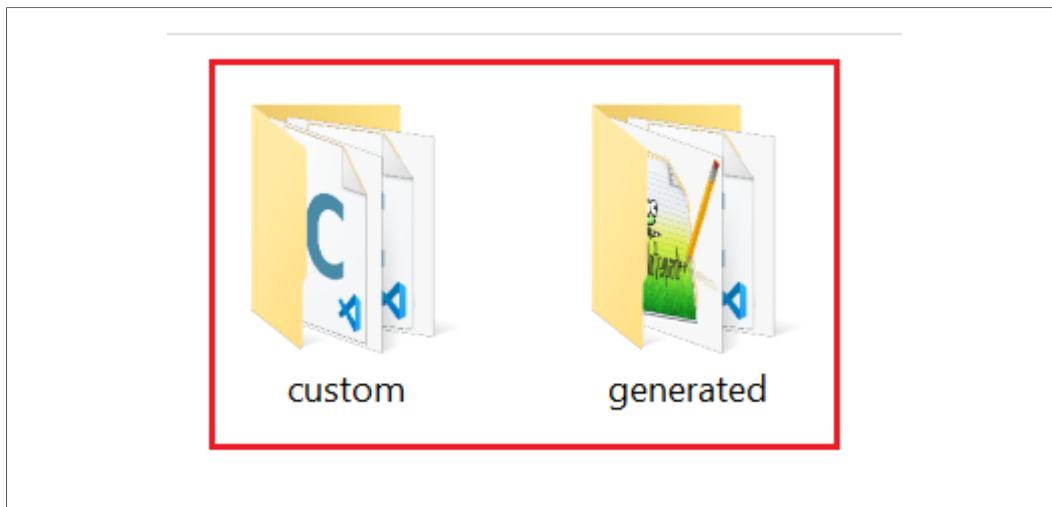
10.1.6 Export source of GUI designed by GUI Guider

To export the source:

1. Use GUI Guider to design a GUI application.
2. Click **Generate Code** in the GUI Guider IDE.



3. Click **File > Export Code** on menu bar to export source code of GUI designed by GUI Guider to a template project folder `D:\rt-thread\rt-thread\bsp\imxrt\imxrt1060-nxp-evk\packages\gui_guider_demo-latest\`.



4. Run `scons --target=mdk5 -s` to generate/update Keil project file `project.uvprojx` which is located at `D:\rt-thread\rt-thread\bsp\imxrt\imxrt1060-nxp-evk`.

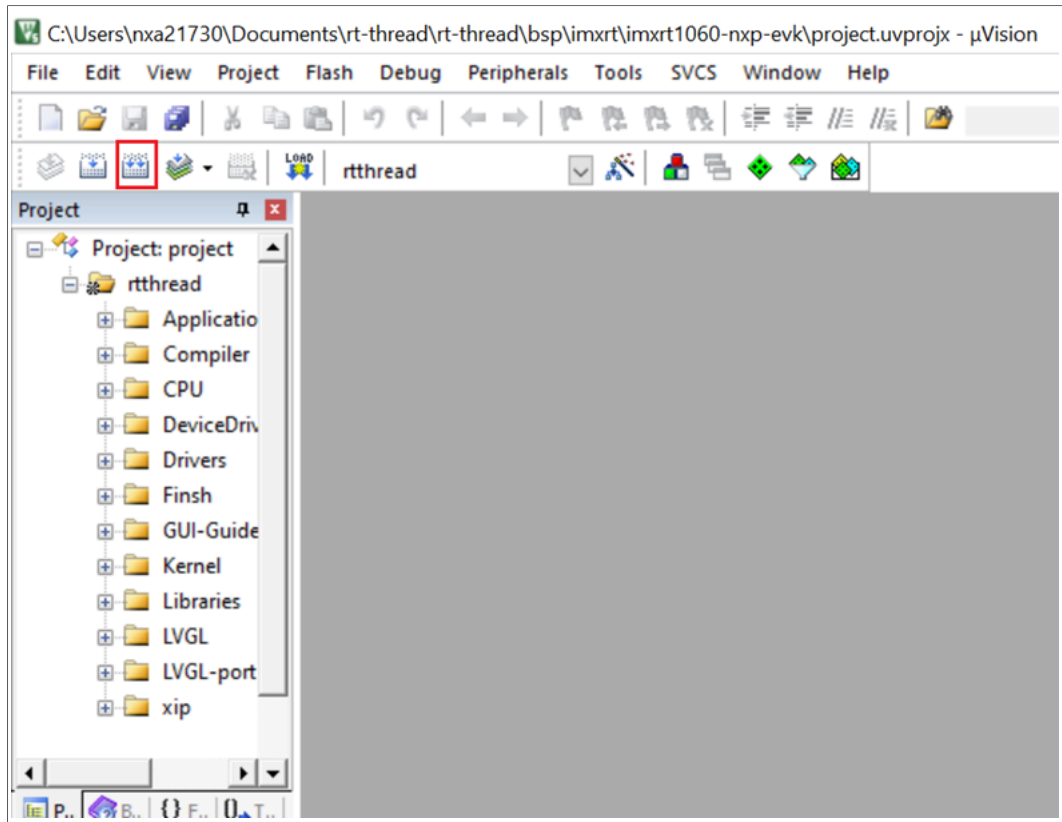
10.1.7 Build and compile

To build and compile:

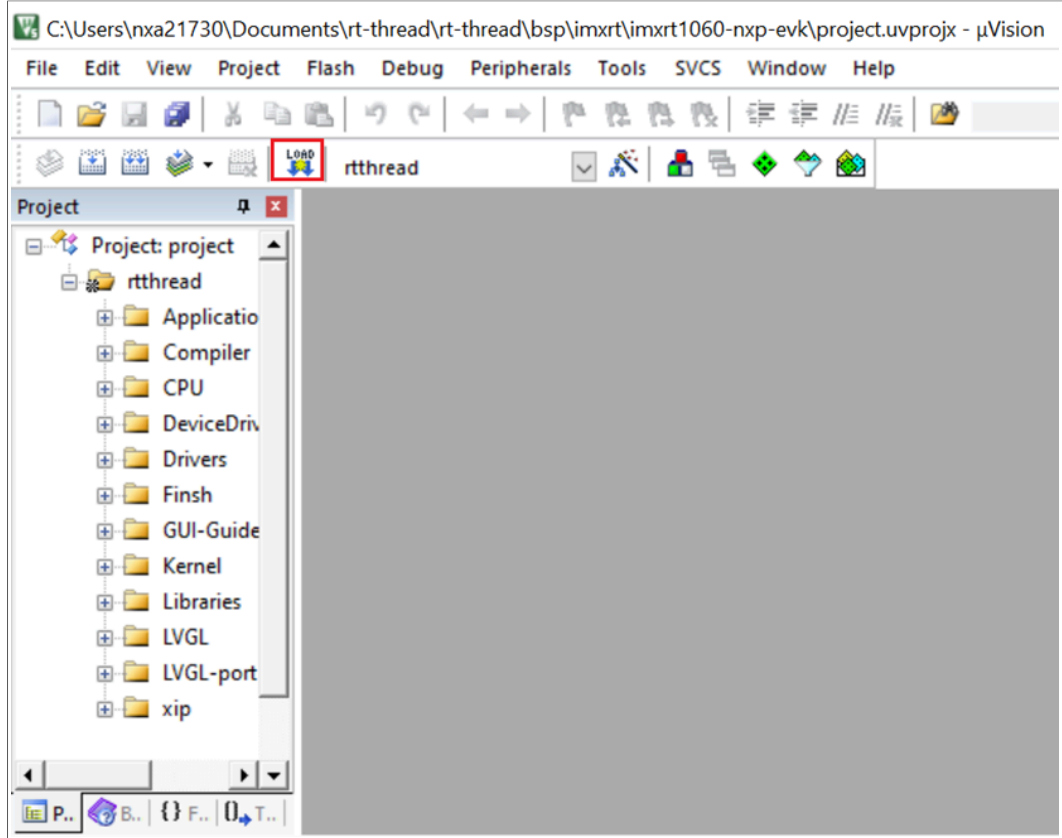
1. Double-click Keil project file `project.uvprojx` in `D:\rt-thread\rt-thread\bsp\imxrt\imxrt1060-nxp-evk` and rebuild all the files.

Note: If the following error appears, update the corresponding source file to replace "lvgl/lvgl.h" with "lvgl.h".

Error: src.c(10): error: 'lvgl/lvgl.h' file not found s



2. Connect i.MX RT1062 to PC with a USB cable. Click 'Download (F8)'.



After performing the above steps, the GUI application designed by GUI Guider can be compiled in RT-Thread and run on i.MX RT1060 board.

10.1.8 Known Issues

- If option **Event > load screen > Delete current screen** is enabled, then the PC hangs when switching between different screens. The workaround is to disable the **Delete current screen** when loading a new screen.

11 Frequently Asked Questions (FAQs)

This chapter lists the Frequently Asked Questions (FAQs) about GUI Guider.

Question: How to avoid simulator running the MCU-specific code?

Answer: GUI Guider provides a predefined macro LV_USE_GUIDER_SIMULATOR in lv_conf.h. Do the following changes in your source files:

```
#if !LV_USE_GUIDER_SIMULATOR // or LV_USE_GUIDER_SIMULATOR == 0
... (MCU specific Code)
#endif
```

12 Revision history

This table summarizes revisions to this document.

Revision history

Revision number	Date	Substantive changes
0	29 October 2020	Initial release.
1	17 November 2020	Updated Work with MCUXpresso IDE .
2	11 January 2021	Added and updated multiple sections.
3	10 May 2021	Added and updated multiple sections for v1.1.
4	30 July 2021	Added and updated multiple sections for v1.2.
5	29 September 2021	Updated multiple sections for v1.2.1.
6	07 January 2022	Updated multiple sections for v1.3.0.
7	31 March 2022	Updated multiple sections for v1.3.1.
8	25 July 2022	Updated multiple sections for v1.4.0

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Date of release: 25 July 2022
Document identifier: GUIGUIDERUG