

TouchGFX optimized graphic framework software expansion for STM32Cube

X-CUBE-TOUCHGFX

TouchGFX
GENERATOR



STM32CubeMX plugin

Graphic HW and SW configuration and project generation

TouchGFX
DESIGNER



TouchGFX PC tool

Graphic application development and simulation

TouchGFX
ENGINE



TouchGFX embedded library

Optimized and Hardware accelerated graphic library

Product status link

[X-CUBE-TOUCHGFX](#)

TouchGFX



Features

- Smartphone animations
 - TouchGFX (available as [X-CUBE-TOUCHGFX](#) Expansion Package) enables smartphone animations such as swipe, scroll, 3D effects, video playback, and others
 - Supports transparency, alpha blending, antialiased fonts, and kerning
 - Instant interaction from touch-panel display or hard-keys at the user's choice
- Easy programming
 - TouchGFX Designer offers drag-and-drop programming with automatic code generation
 - More than 30 widgets (such as swipe container, animated image, shapes, clock, scroll list, and others)
 - Custom triggers and actions
 - Easy addition of an own C++ developer code for the creation of any unique UI application
 - Support of a variety of IDEs such as IAR Systems® IAR Embedded Workbench®, Arm® Keil® MDK-ARM, and GCC-based IDEs such as [STM32CubeIDE](#)
 - Easy interfacing with any C code using the *Model-View-Presenter* pattern
- Minimum CPU load and footprints
 - Taking full benefit of STM32 graphic hardware accelerators
 - Optimized library footprints requiring from 20 Kbytes of flash memory and 10 Kbytes of RAM
 - Partial frame buffering minimizing graphic buffer sizes and enabling graphic UI support from lowest-cost STM32 options
 - Running with RTOS or on bare metal, supporting the STM32 microcontrollers based on the Arm® Cortex®-M0+, M3, M4, M33, and M7 processors
- Fast start of UI development
 - STM32 display kits are fully supported (one click) in TouchGFX Designer
 - TouchGFX Generator helps users start on their own STM32 hardware
 - Reference demo examples demonstrate achievable UI performance
- Part of STM32 ecosystem
 - TouchGFX Engine compiled library running on any STM32 microcontroller
 - Smooth interoperability with STM32Cube MCU Packages, [STM32CubeMX](#), and [STM32CubeIDE](#)
 - TouchGFX project examples using [STM32CubeMX](#), [STM32CubeIDE](#), and STM32Cube MCU Packages
- Support and documentation
 - TouchGFX knowledge base for technical literature
 - Active TouchGFX community for online support and graphical discussions
 - Videos and webinars addressing embedded graphic topics

Description

TouchGFX is an advanced, free-of-charge GUI optimized for STM32 microcontrollers. Taking advantage of the STM32 graphical hardware acceleration, architecture, and ecosystem, TouchGFX accelerates the HMI-of-Things revolution through the creation of stunning smartphone user interfaces on embedded devices ranging from simple low-color UI applications up to high-resolution and high-color UI applications.

TouchGFX is optimized for STM32 microcontrollers, needing only a limited amount of memory for running smooth GUIs.

The TouchGFX solution is distributed as an STM32Cube Expansion Package ([X-CUBE-TOUCHGFX](#)), which includes all TouchGFX software to help users develop their UI applications. TouchGFX interoperability within the STM32 ecosystem provides users with an easier and faster development process.

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1 Detailed description

1.1 Ordering information

X-CUBE-TOUCHGFX is available for free download from the www.st.com website.

1.2 What is STM32Cube?

STM32Cube is an STMicroelectronics original initiative to improve designer productivity significantly by reducing development effort, time, and cost. STM32Cube covers the whole STM32 portfolio.

STM32Cube includes:

- A set of user-friendly software development tools to cover project development from conception to realization, among which are:
 - [STM32CubeMX](#), a graphical software configuration tool that allows the automatic generation of C initialization code using graphical wizards
 - [STM32CubeIDE](#), an all-in-one development tool with peripheral configuration, code generation, code compilation, and debug features
 - [STM32CubeCLT](#), an all-in-one command-line development toolset with code compilation, board programming, and debug features
 - STM32CubeProgrammer ([STM32CubeProg](#)), a programming tool available in graphical and command-line versions
 - STM32CubeMonitor ([STM32CubeMonitor](#), [STM32CubeMonPwr](#), [STM32CubeMonRF](#), [STM32CubeMonUCPD](#)), powerful monitoring tools to fine-tune the behavior and performance of STM32 applications in real time
- [STM32Cube MCU and MPU Packages](#), comprehensive embedded-software platforms specific to each microcontroller and microprocessor series (such as STM32CubeF7 for the STM32F7 series), which include:
 - STM32Cube hardware abstraction layer (HAL), ensuring maximized portability across the STM32 portfolio
 - STM32Cube low-layer APIs, ensuring the best performance and footprints with a high degree of user control over hardware
 - A consistent set of middleware components such as RTOS, USB, TCP/IP, graphics, and FAT file system
 - All embedded software utilities with full sets of peripheral and applicative examples
- [STM32Cube Expansion Packages](#), which contain embedded software components that complement the functionalities of the STM32Cube MCU and MPU Packages with:
 - Middleware extensions and applicative layers
 - Examples running on some specific STMicroelectronics development boards

1.3 How does this package complement STM32Cube?

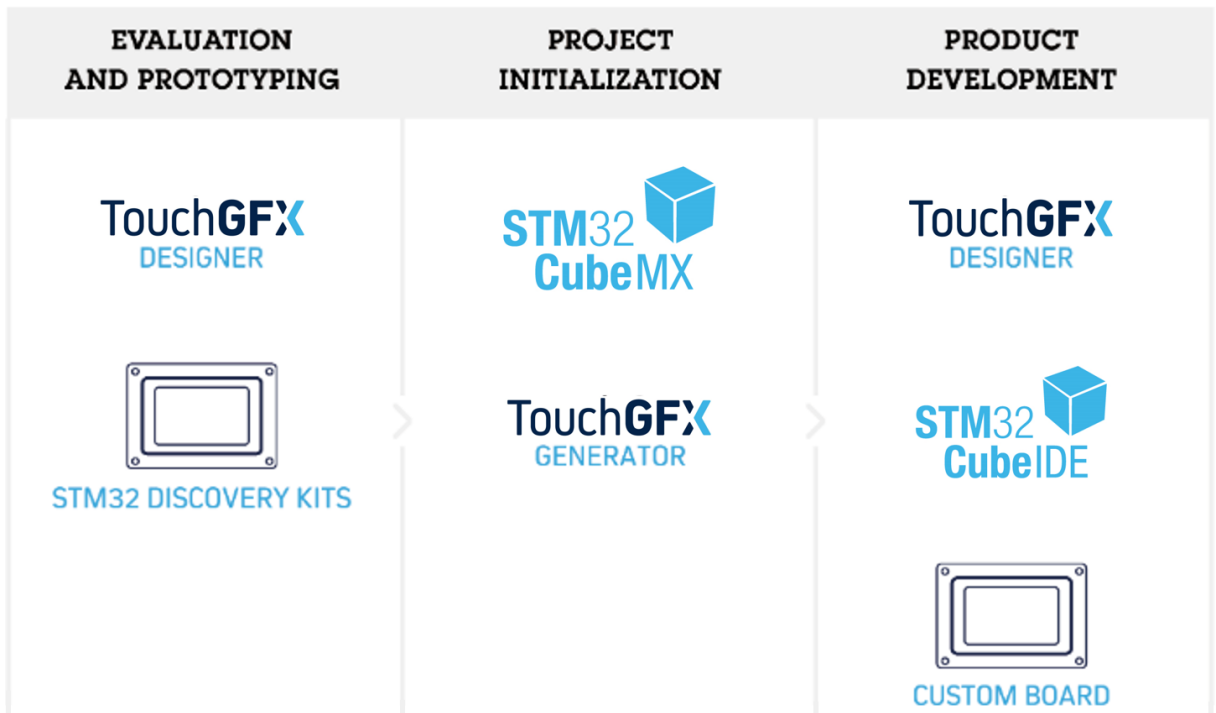
The X-CUBE-TOUCHGFX Expansion Package is composed of three main tools:

- **TouchGFX Engine:**
The TouchGFX compiled library runs on any STM32 microcontroller with any RTOS or bare metal. TouchGFX Engine enables smartphone animations on limited memory resource hardware.
- **TouchGFX Designer:**
A state-of-the-art graphical designer tool for creating, managing and building user's graphic applications. The WYSIWYG software includes different widgets, triggers and actions, making it faster and easier to create unique UIs. TouchGFX Designer supports the user in easy management of image formats, multiple languages and fonts.

- **TouchGFX Generator:**
TouchGFX Generator supports users in their smooth generation of TouchGFX projects for their custom hardware based on any STM32 MCU, making them ready to develop their UI applications in TouchGFX Designer. Available as an STM32CubeMX plugin, TouchGFX Generator helps users to configure their TouchGFX project related software and hardware peripherals. It generates a full and custom TouchGFX project based on the selected graphic settings, IDE and latest STM32Cube MCU Package. For external components unknown to STM32CubeMX such as displays, touch controllers or external memories, a template is generated helping the users to add their own code.

Figure 1 shows how X-CUBE-TOUCHGFX is integrated in the STM32 ecosystem to develop an embedded UI faster, easier and cheaper.

Figure 1. STM32 graphics ecosystem



Prototyping using STM32 evaluation kits

1. Start from TouchGFX Designer, choosing one out-of-the-box supported STM32 display kit, in combination with a new or prebuilt demonstration application
2. Generate the full project with full board support package including STM32Cube software and external component drivers

STM32-based custom board

1. Start from STM32CubeMX by installing TouchGFX Generator as additional software
2. Configure the selected MCU hardware features and the TouchGFX software framework
3. Generate the project for a preferred IDE and compiler

1.4 STM32 MPU add-on

X-TOUCHGFX-MPU is an add-on of the X-CUBE-TOUCHGFX Expansion Package specifically designed for STM32 microprocessors.

This add-on extends the TouchGFX features to some STM32 MPU devices. For details about compatible targets and prerequisites, refer to the X-TOUCHGFX-MPU documentation:

- On the X-CUBE-TOUCHGFX product page of the STMicroelectronics web site at www.st.com
- In the X-TOUCHGFX-MPU article of the STMicroelectronics STM32 MPU wiki at wiki.st.com/stm32mpu



2 License

X-CUBE-TOUCHGFX is delivered under the [SLA0048](#) software license agreement and its Additional License Terms.

Revision history

Table 1. Document revision history

Date	Revision	Changes
13-Jan-2020	1	Initial release.
01-Jul-2020	2	Updated license version in <i>License</i> . Updated <i>What is STM32Cube?</i>
23-Sep-2020	3	Added <i>Minimum CPU load and footprints</i> in <i>Features</i> . Updated <i>Designer software component license agreements</i> and <i>Tools software component license agreements</i> .
14-Jun-2021	4	Updated <i>License</i> .
12-Jul-2024	5	Added STM32 MPU add-on and updated What is STM32Cube?

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