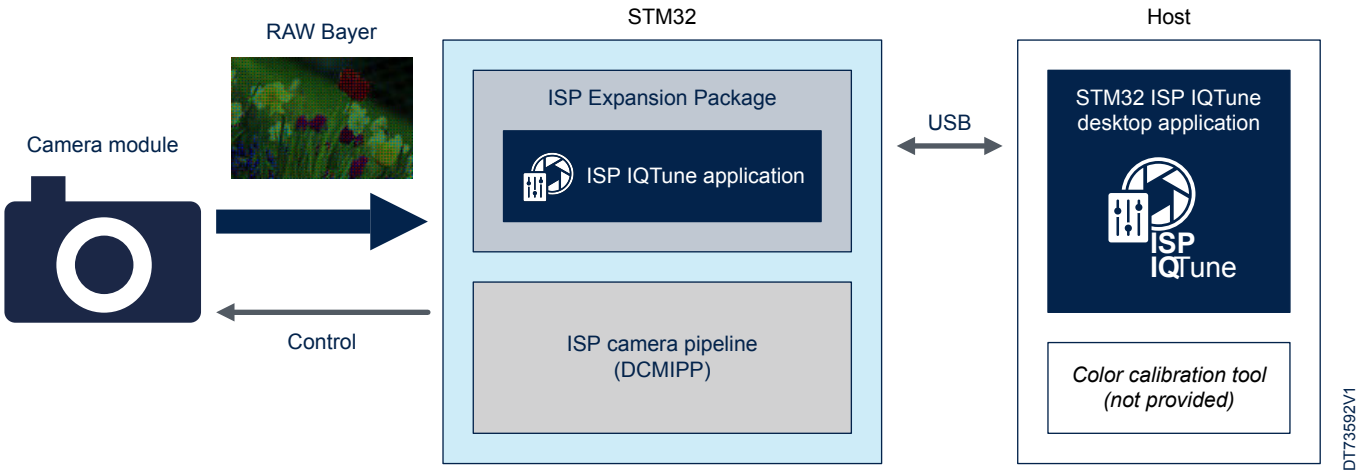
STM32-ISP-IQTune

Data brief

STM32 image signal processing (ISP) tuning software tool



Product status link
STM32-ISP-IQTune

Features

- Step-by-step tuning of the STM32 ISP blocks for any RAW image sensor and its associated lens
- Intuitive user interface for easy visualization and configuration of the STM32 ISP parameters
- Live preview for the immediate checking of modified settings (only supported on STM32MP25xx)
- Automatic identification of the image sensor and its main characteristics from shared sensor driver information
- Configuration of advanced 2A algorithms:
  - Auto exposure (AE)
  - Auto white balance (AWB)
- Integrated tool for image quality analysis, working with any illuminant, including:
  - Automated calculation of the STM32 ISP gain to be applied
  - Automated calculation of the color correction matrix
  - Color accuracy analysis with delta metrics between the rendered color and the reference color
- Support for custom color checker
- STM32 ISP configuration import and export modes
- Detailed documentation and tutorials for users

Description

STM32 ISP IQTune (STM32-ISP-IQTune) is a comprehensive STM32 ISP tuning software. It offers a wide range of features and services to help professional and nonprofessional STM32 users to tune their STM32 embedded ISP.

It is composed of two parts:

- STM32 ISP IQTune desktop application, a desktop application running on a host computer (Linux® Ubuntu®, Windows®, or macOS®)
- ISP IQTune application, an embedded application running on the device to be tuned

The two parts communicate via a USB connection between the host computer and the STM32 target to be tuned. STM32 ISP IQTune provides all the services for the users to tune their STM32 ISP for an RGB RAW Bayer or monochrome RAW sensor and its associated lens. STM32 ISP IQTune gives access to the tuning of STM32 ISP parameters. It can analyze the image quality for:

- The easy tuning of the STM32 ISP in any light condition
- The definition of the white balance ISP gain (RGB sensor only)
- The settings of the color correction matrix for a white balance profile (RGB sensor only)

Finally, STM32 ISP IQTune provides information and metrics about color accuracy according to the ISP configuration defined by the user.

Additionally, the following materials are needed to tune the STM32 ISP:

- Color checker chart
- Spectrometer
- Light box (optional)

Refer to the STM32 MPU wiki at wiki.st.com/stm32mpu for a description of the full ISP tuning procedure on compatible STM32 microprocessors.

Refer to the STM32 MCU wiki at wiki.st.com/stm32mcu for a description of the full ISP tuning procedure on compatible STM32 microcontrollers.

1 Material requirements

Additional materials are requested to tune the STM32 ISP:

- Color checker chart: X-Rite ColorChecker® Classic or custom color checker
  A color checker chart is used in ISP tuning. It ensures accurate color reproduction by providing a reference for adjusting the color response of the sensor. It helps in calibrating the ISP to match real-world colors, improving image quality and consistency.
  Important: By default, STM32 ISP IQTune analyzes the color rendering based on the X-Rite ColorChecker® Classic color chart edited in November 2014. The version before November 2014 or a custom color checker can be selected as alternative options.
- Spectrometer
  A spectrometer is used in ISP tuning to measure the color values of light sources accurately. It provides precise color data, which is essential for calibrating the ISP to achieve accurate color reproduction. It is mainly used to get the color temperature of the scene.
- Light box (optional)
  A light box is used in ISP tuning to provide a consistent and controlled lighting environment, ensuring uniform illumination for accurate color and exposure calibration. It eliminates external lighting variables, enabling precise adjustments of the ISP settings.

2 Supported devices

In STM32-ISP-IQTune associated packages, the X-LINUX-ISP OpenSTLinux Expansion Package supports the STM32MP25xx microprocessors while the X-CUBE-ISP STM32Cube Expansion Package supports the STM32N6 microcontrollers.

X-LINUX-ISP and X-CUBE-ISP are a free-of-charge open-source software packages that provide image signal processing (ISP) image quality software. They target the STM32 microprocessors and microcontrollers embedding an ISP camera pipeline called DCMIPP. They offer advanced image quality tuning, enabling developers to easily create ISP-based applications.

X-LINUX-ISP is available on *www.st.com*, and on GitHub as a Yocto meta-layer. It features:

- A preintegration into a Linux® distribution based on the OpenSTLinux STMicroelectronics environment.
- The libcamera with the support of the DCMIPP ISP image-processing algorithm (IPA), integrating auto exposure (AE), auto white balance (AWB), and all ISP controls.
- The libcamerasrc Gstreamer plugin supporting DCMIPP ISP properties.
- A sensor tuning application running on the target, which interacts through USB with the STM32 ISP IQTune desktop application executed on the host computer. It provides access to the ISP configuration and performs a sensor tuning procedure.
- Simple preview application examples taking advantage of libcamera and libcamerasrc Gstreamer plugin for easy prototyping.

X-CUBE-ISP is available on *www.st.com* and on GitHub. It features:

- An embedded ISP Library middleware, running on the target, which hosts 2A algorithms (AE and AWB) and mechanisms to control the ISP and load the sensor tuning file.
- A sensor tuning application running on the target, which interacts through USB with the STM32 ISP IQTune desktop application executed on the host computer. It provides access to the ISP configuration and performs a sensor tuning procedure.
- Simple preview application examples taking advantage of the ISP Library middleware for easy prototyping.

3 General information

In STM32-ISP-IQTune:

- The STM32 ISP IQTune desktop application runs on a Linux® Ubuntu®, Windows®, or macOS® desktop.
- The X-LINUX-ISP ISP IQTune application runs on STM32 microprocessors based on the Arm® Cortex®-A processor.
- The X-CUBE-ISP ISP IQTune application runs on STM32 microcontrollers based on the Arm® Cortex®-M processor.

Note: *Linux® is a registered trademark of Linus Torvalds.*

Ubuntu® is a registered trademark of Canonical Ltd.

Windows is a trademark of the Microsoft group of companies.

macOS® is a trademark of Apple Inc., registered in the U.S. and other countries and regions.

Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

arm

3.1 Download information

STM32-ISP-IQTune is available for free download from the *www.st.com* website.

3.2 License

STM32-ISP-IQTune is delivered under the SLA0048 software license agreement and its Additional License Terms.

Revision history

Table 1. **Document revision history**

Date	Revision	Changes
11-Oct-2024	1	Initial release.
09-Dec-2024	2	Added support for STM32N6 microcontrollers with the X-CUBE-ISP STM32Cube Expansion Package: • Updated *Description* • Updated *Supported devices* • Updated *General information*
09-Jul-2025	3	Added support for custom color checker: • Updated Features • Updated Material requirements