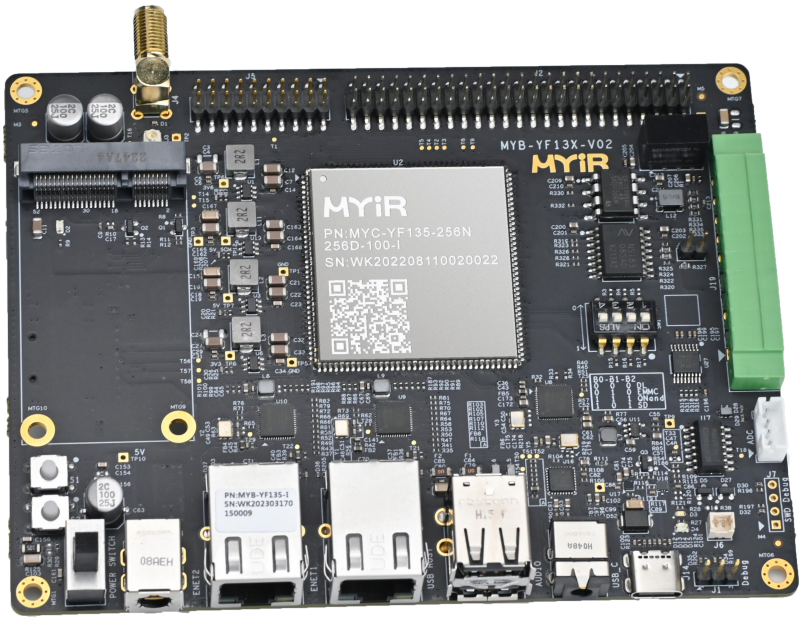
MYiR 米尔电子
Make Your Idea Real

MYD-YF13X
Development Board
Overview



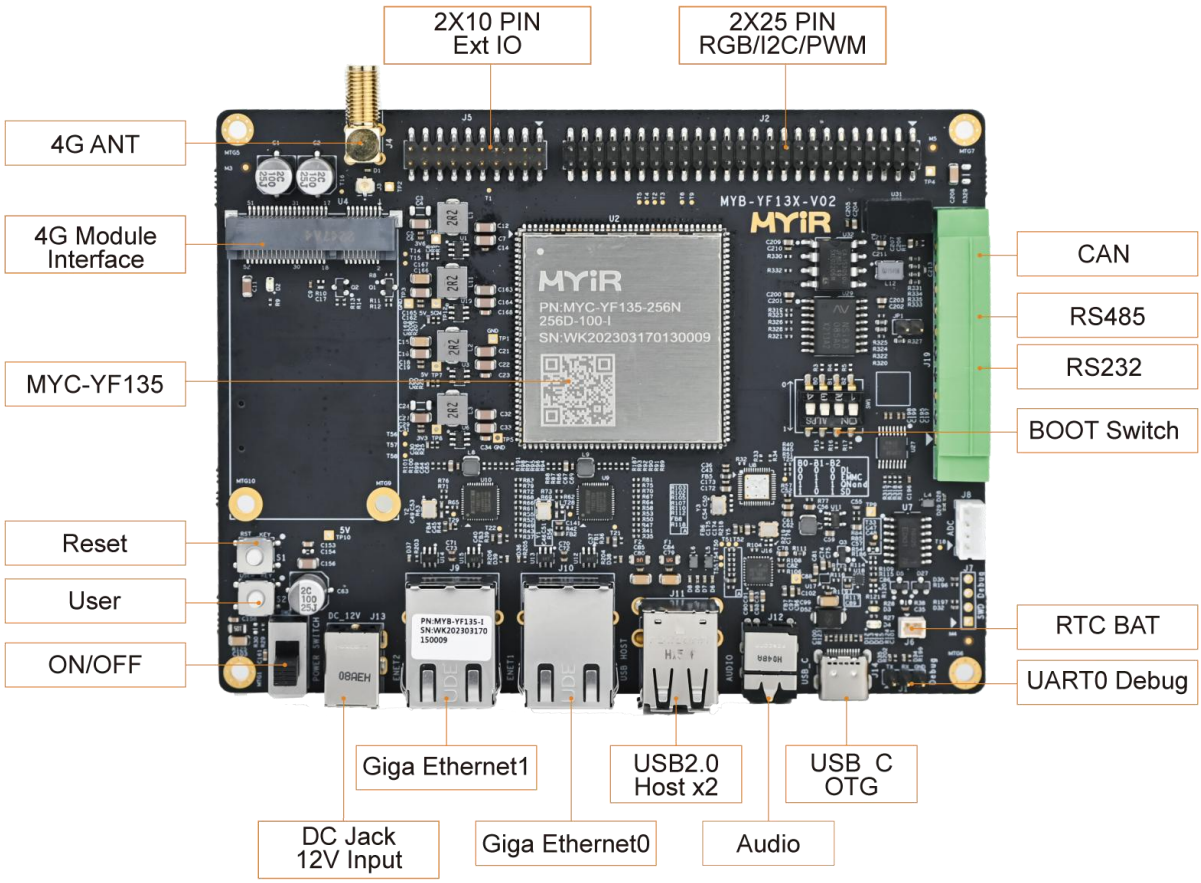
- ✓ *MYC-YF13X CPU Module as Controller Board*
- ✓ *1GHz ST STM32MP135 ARM Cortex-A7 Processor*
- ✓ *256/512MB DDR3L, 256MB Nand FLASH/4GB eMMC, 32Kbit EEPROM*
- ✓ *RS232, RS485, 2 x USB 2.0 HOST, USB 2.0 OTG, CAN, Micro SD Card Slot*
- ✓ *2 x Gigabit Ethernet, 4G LTE Module Interface*
- ✓ *1x LCD interface, 1 x Parallel Camera Interface, Audio Input/Output*
- ✓ *Supports Running Linux 5.15 OS*
- ✓ *Optional 7-inch LCD Module, Camera Module and RGB-to-HDMI Module*

The **MYD-YF13X Development Board** consists of a compact **MYC-YF13X System-On-Module** and a base board to provide a complete evaluation platform for **ST STM32MP135** ARM Cortex-A7 processor which runs at up to 1GHz and features a dedicated LCD-TFT parallel display interface, a 16-bit parallel camera and dual Ethernet ports. It is particularly suitable for applications such as entry-level industrial human-machine interfaces (HMI) and embedded devices for energy and power management.

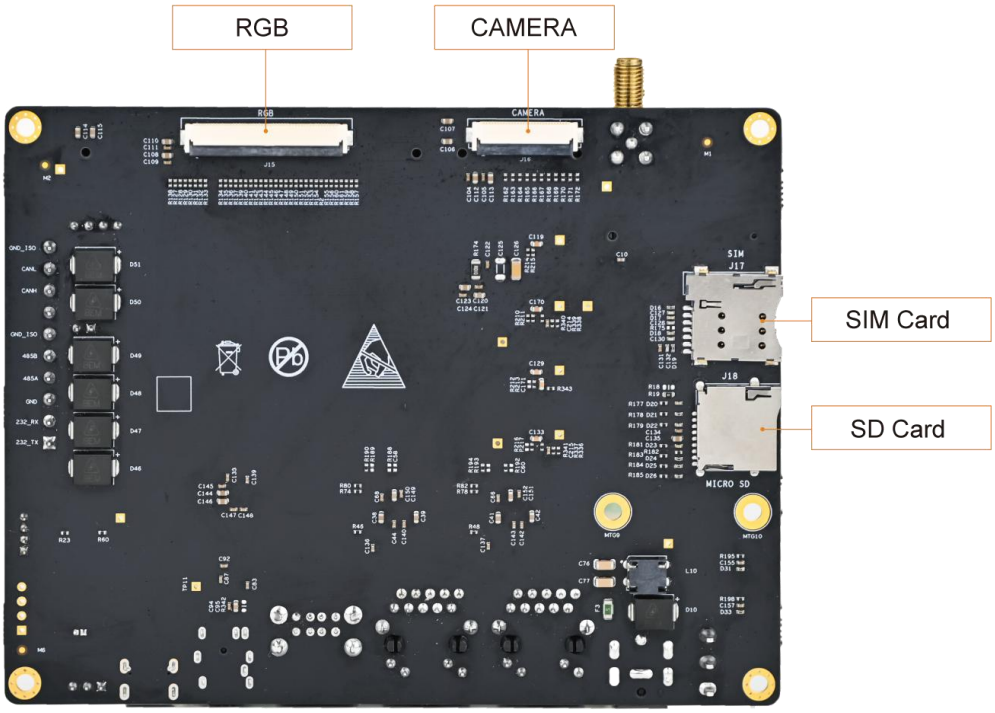
The **MYC-YF13X Module** is populated on the **MYD-YF13X Development Board** through 1.0mm pitch 148-pin stamp-hole (Castellated-Hole) interface. It is a highly-integrated SoM which combines the **STM32MP135DAF7** processor, DDR3L and Memory Flash. The base board has brought out rich peripherals through connectors and headers such as RS232, RS485, two USB 2.0 HOST and one USB 2.0 OTG, two Gigabit Ethernet, CAN, one Micro SD card slot, one USB based Mini-PCIe 4G Module interface with one SIM card holder, LCD interface, Camera interface, Audio input and output as well as two extension headers.

The MYD-YF13X is running Linux OS. MYIR provides abundant software resources for Yocto based MYIR MEasy-HMI V2.0 system including kernel and driver source code, tools to enable users to start their development rapidly and easily.

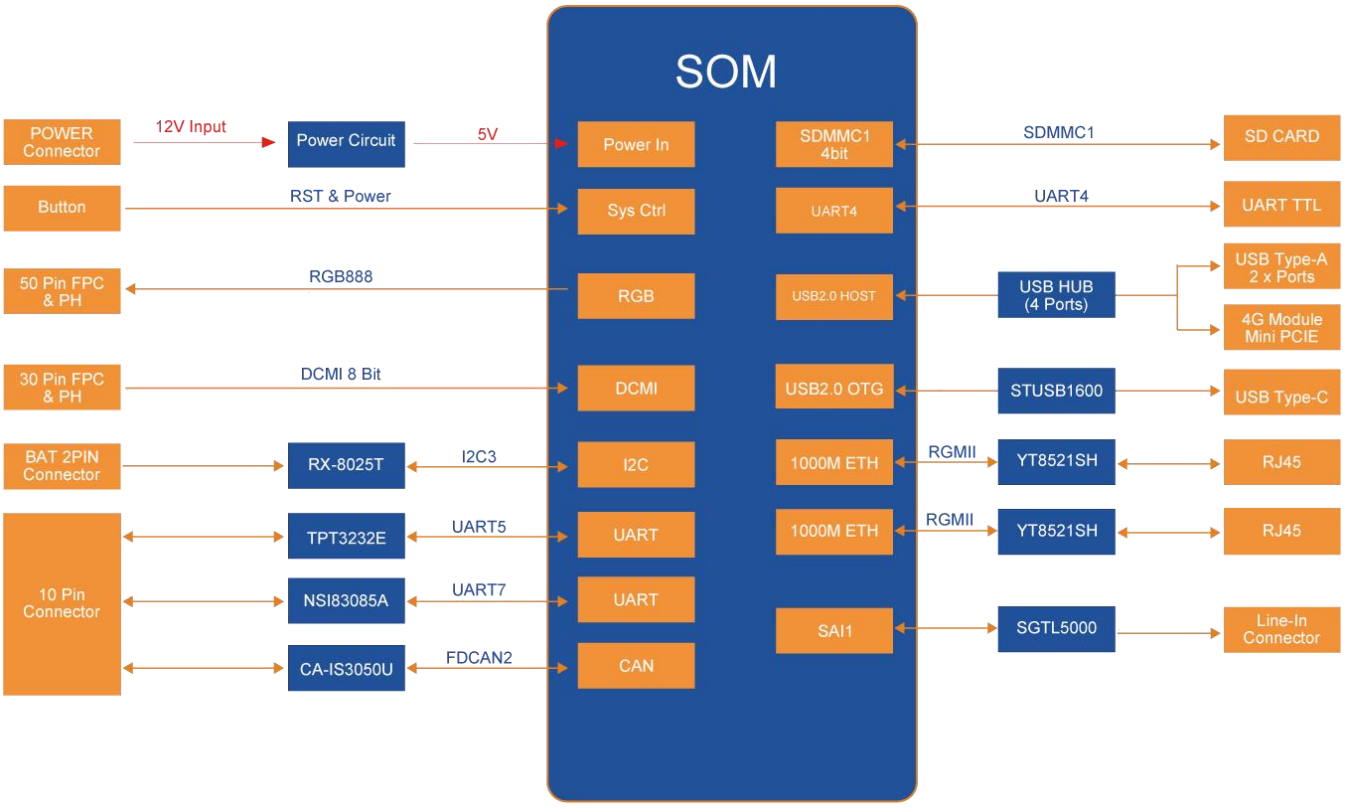
The **MYD-YF13X Development Board** is delivered with Quick Start Guide, one USB to TTL serial cable, one 12V/2A power adapter and one DC Power jack adapter. MYIR also offers **MY-CAM011B BUS Camera Module**, **MY-LCD70TP-C 7 inch LCD Module** and **MY-RGB2HDMI Module** as add-on options for the board.



MYD-YF13X Development Board Top-view



MYD-YF13X Development Board Bottom-view



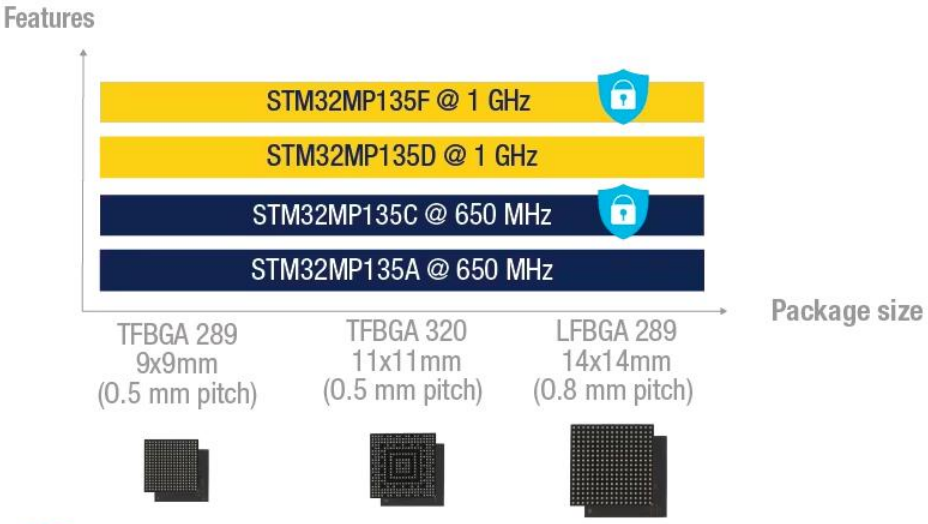
MYD-YF13X Development Board Function Block Diagram

Hardware Specification

The **MYC-YF13X System-On-Module** populated on the **MYD-YF13X Development Board** is using the 11 x 11mm, 0.5 mm ball pitch, 320ball TFBGA package, 1GHz **ST STM32MP135DAF7** MPU which belongs to the **ST STM32MP135** product line and features a single Arm Cortex-A7 core running up to 1GHz, a dedicated LCD-TFT parallel display interface, a 16-bit parallel camera and dual Ethernet ports to offer cost- & energy-efficient processing capabilities. The STM32MP135 line is available in 3 different packages for a cost-efficient PCB architecture.

Feature	Description
CPU	32-bit Arm® Cortex®-A7 1GHz
External Storage	up to LPDDR2/LPDDR3-1066 16-bit up to DDR3/DDR3L-1066 16-bit Dual Quad-SPI memory interface 16-bit data bus: parallel interface to connect external ICs and SLC NAND memories with up to 8-bit ECC
Video Engine	Video Encoder / Decoder support up to WXGA (1366 × 768) @60 fps or up to Full HD (1920 x 1080) @ 30 fps pixel clock up to 90 MHz two layers (incl. 1 secured) with programmable color
Analog Peripheral	2 ADCs with 12-bit max. resolution up to 5 Msps 1 x temperature sensor 1 x digital filter for sigma-delta modulator (DFSDM) with 4 channels and 2 filters Internal or external ADC reference VREF+
RTC	Internal oscillators: 64 MHz HSI oscillator, 4 MHz CSI oscillator, 32 kHz LSI oscillator External oscillators: 8-48 MHz HSE oscillator, 32.768 kHz LSE oscillator 4 x PLLs with fractional mode
Controller	56 physical channels in total 1 x high-speed general-purpose master direct memory access controller (MDMA) 3 x dual-port DMAs with FIFO and request router capabilities for optimal peripheral management
Safety Engine	TrustZone® peripherals, 12 x tamper pins including 5 x active tampers Temperature, voltage, frequency and 32 kHz monitoring
Connection	5 x I2C FM+ (1 Mbit/s, SMBus/PMBus) 4 x UART + 4 x USART (12.5 Mbit/s, ISO7816 interface, LIN, IrDA, SPI slave) 5 x SPI (50 Mbit/s, including 4 with full-duplex I 2S audio class accuracy via internal audio PLL or external clock) 2 x SAI (stereo audio: I2S, PDM, SPDIF Tx) SPDIF Rx with 4 inputs 2 x SDMMC up to 8 bits (SD/eMMC/SDIO) 2 x CAN controllers supporting CAN FD protocol 2 x USB 2.0 high-speed Host – or 1 × USB 2.0 high-speed Host +1 × USB 2.0 high-speed OTG simultaneously 2 x Ethernet MAC/GMAC – IEEE 1588v2 hardware, MII/RMII/RGMII 8- to 16-bit camera interface, 3 Mpix @30 fps or 5Mpix @15 fps incolor or monochrome with pixel clock @120 MHz (max freq)
Packaging	BGA 320 balls, 11 mm x 11 mm size,0.5 mm ball pitch

STM32MP135 Processor Resources



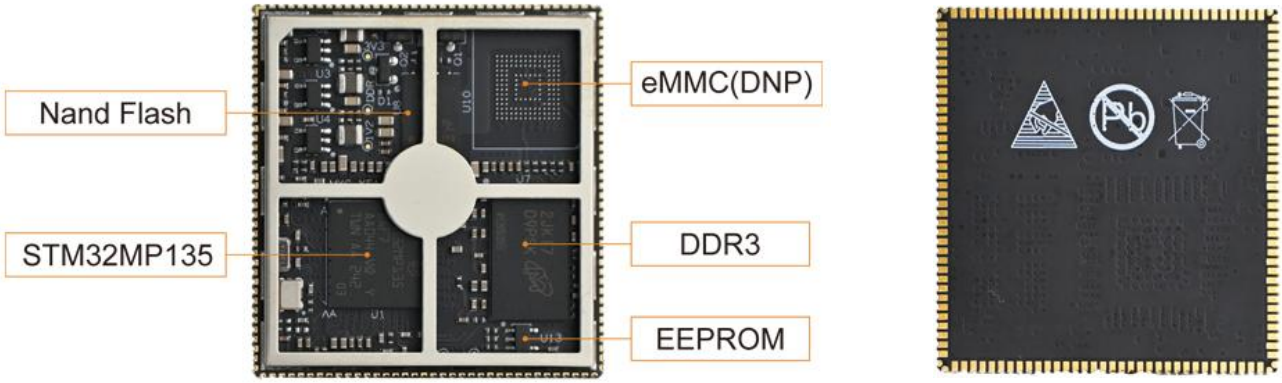
STM32MP135 Block Diagram

The **MYD-YF13X Development Board** is using the **MYC-YF13X System-On-Module** as core controller board. It takes full features of STM32MP135DAF7 processor and the main features are characterized as below:

Mechanical Parameters

- Dimensions: 137.29mm x 105mm (base board), 37mm x 39m (SOM)
- PCB Layers: 6-layer design (base board), 10-layer design (SOM)
- Power supply: +12V/2A Power supply (base board), 5V/1A (SOM)
- Working temperature: -40~85 Celsius (industrial grade)

The MYD-YF13X Controller Board (MYC-YF13X System-On-Module)



MYC-YF13X CPU Top-view and Bottom-view

Processor

- Up to 1GHz ST STM32MP135 ARM Cortex-A7 processor (STM32MP135DAF7)

Memory

- 256/512MB DDR3L
- 256MB Nand FLASH/4GB eMMC
- 32Kbit EEPROM

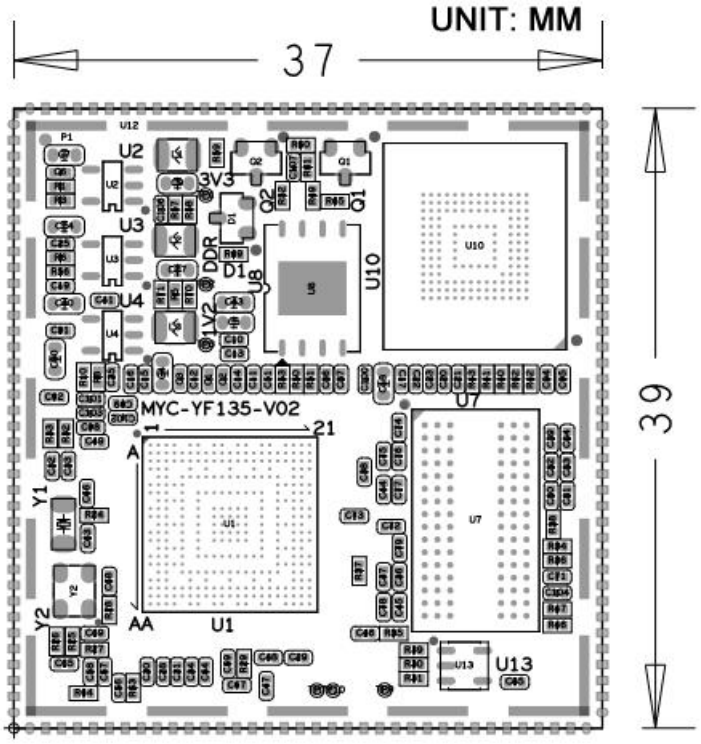
Peripherals and Signals Routed to Pins

- 1.0mm pitch 148-pin Stamp Hole Expansion Interface
  - 2 x RGMII
  - 2 x USB2.0
  - 8 x UART
  - 2 x SCI
  - 2 x CAN FD
  - 4 x I2S
  - 5 x I2C
  - 2 x ADC
  - 1 x Parallel Camera
  - 1 x RGB
  - 2 x SAI
  - Up to 108 GPIOs

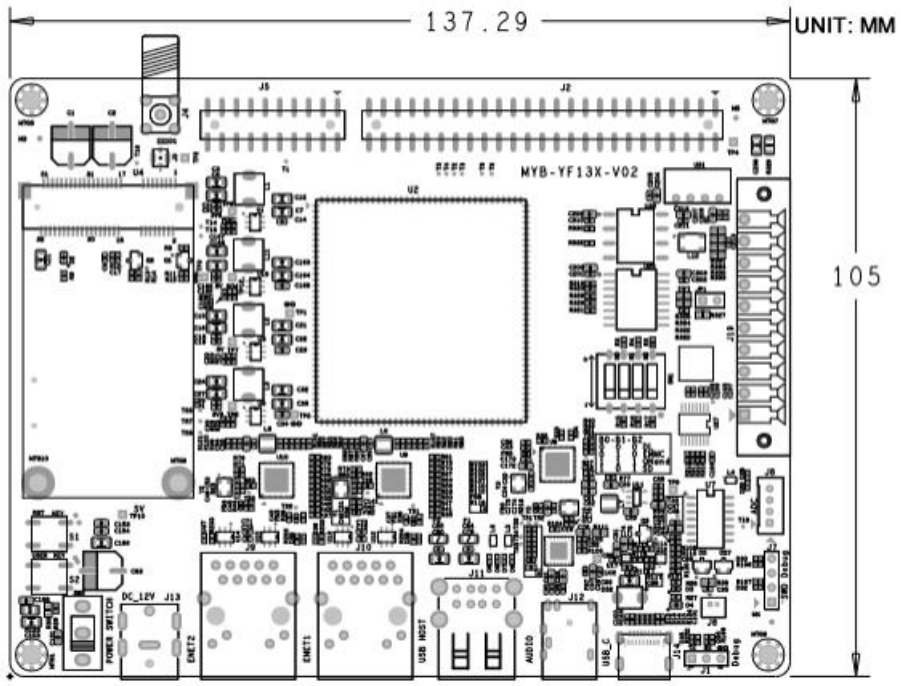
Note: the peripheral signals brought out to the expansion interface are listed in maximum number. Some signals are reused. Please refer to the processor datasheet and the CPU Module pinout description file.

The MYD-YF13X Development Board Base Board

- 1 x Power Jack
- 1 x Power Switch
- Serial ports
  - 1 x Debug UART (TTL)
  - 1 x RS232
  - 1 x RS485
- USB
  - 1 x USB 2.0 OTG port
  - 2 x USB 2.0 Host ports
  - 1 x Mini-PCIe interface (for USB based 4G LTE Module)
- 1 x SIM Card Slot
- 1 x 4G Antenna Interface
- 2 x 10/100/1000 Mbps Ethernet interfaces
- 1 x CAN
- Extension interface
  - 1 x 2*10-pin header
  - 1 x 2*25-pin header (RGB/I2C/PWM)
- 1 x Micro SD Card Slot
- 2 x Buttons (one for RESET and one for USER)
- Audio Input and Output Interface (1 x 3.5mm Headphone/Mic port)
- 1 x DPV Camera Interface (0.5mm pitch 30-pin FPC connector)
  Supports MYIR's MY-CAM011B Camera Module
- 1 x LCD interface
  Supports MYIR's MY-LCD70TP-C LCD Module with Capacitive Touch Screen



MYC-YF13X Dimensions Chart



MYD-YF13X Base Board Dimensions Chart

Software Features

The **MYD-YF13X Development Board** supports for Linux OS and comes with complete software package. The kernel and many peripheral drivers are available in source code to assist clients to expedite their development. The following are a summary of the software features:

Item	Feature	Description	Source code
Bootstrap	Tf-a	First Boot Program tf-a-STM32MP-2.6	YES
Bootloader	U-boot	Second Boot Program uboot_2021.10	YES
Linux kernel	Linux kernel	Based on kernel_ Version 5.15.67 Customization	YES
Device Driver	USB Host	USB Host driver	YES
	USB OTG	USB OTG driver	YES
	I2C	I2C bus driver	YES
	SPI	SPI bus driver	YES
	Ethernet	YT8521SH driver	YES
	SDHI	eMMC/SD Card storage driver	YES
	LVDS	LCD driver	YES
	4G	4G driver	YES
	PWM	PWM control	YES
	ADC	ADC driver	YES
	RTC	RTC driver	YES
	GPIO	Universal GPIO driver	YES
	UART	RS232/TTL driver	YES
	CAN	CAN driver	YES
	RS485	RS485 driver	YES
Image file	myir-image-core	Image built in Yocto without GUI interface	YES
	myir-image-full	A fully functional image built with Yocto	YES

MYD-YF13X Software Features

Order Information

<table>
<tr><th>Product Item</th><th>Part No.</th><th>Packing List</th></tr>
<tr><td rowspan="2">MYD-YF13X
Development Board</td><td>MYD-YF135-256N256D-100-I</td><td rowspan="2">✓ One MYD-YF13X Development Board (including MYC-YF13X SOM)
✓ One USB to UART Debug cable
✓ One 12V/2A Power adapter
✓ One DC Power jack adapter
✓ One Quick Start Guide</td></tr>
<tr><td>MYD-YF135-4E512D-100-I</td></tr>
<tr><td rowspan="2">MYC-YF13X
System-On-Module</td><td>MYC-YF135-256N256D-100-I</td><td rowspan="2">✓ One MYC-YF13X SOM</td></tr>
<tr><td>MYC-YF135-4E512D-100-I</td></tr>
<tr><td>MY-LCD70TP-C LCD Module</td><td>MY-TFT070CV2</td><td rowspan="2">Add-on Options
✓ MY-TFT070CV2 LCD Module
✓ MY-CAM011B BUS Camera Module</td></tr>
<tr><td>MY-CAM011B BUS Camera Module</td><td>MY-CAM011B</td></tr>
<tr><td colspan="3">Note:

1. One MYD-YF13X Development Board comprises one MYC-YF13X SOM mounted onto the base board. If you require additional SOMs, you may place order for extras.

2. Bulk discounts are available. For inquiries, kindly contact MYIR.

3. We cater to custom design requests based on the MYD-YF13X, whether it involves reducing, adding or modifying the existing hardware components to suit the customers' specific needs.</td></tr>
</table>

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