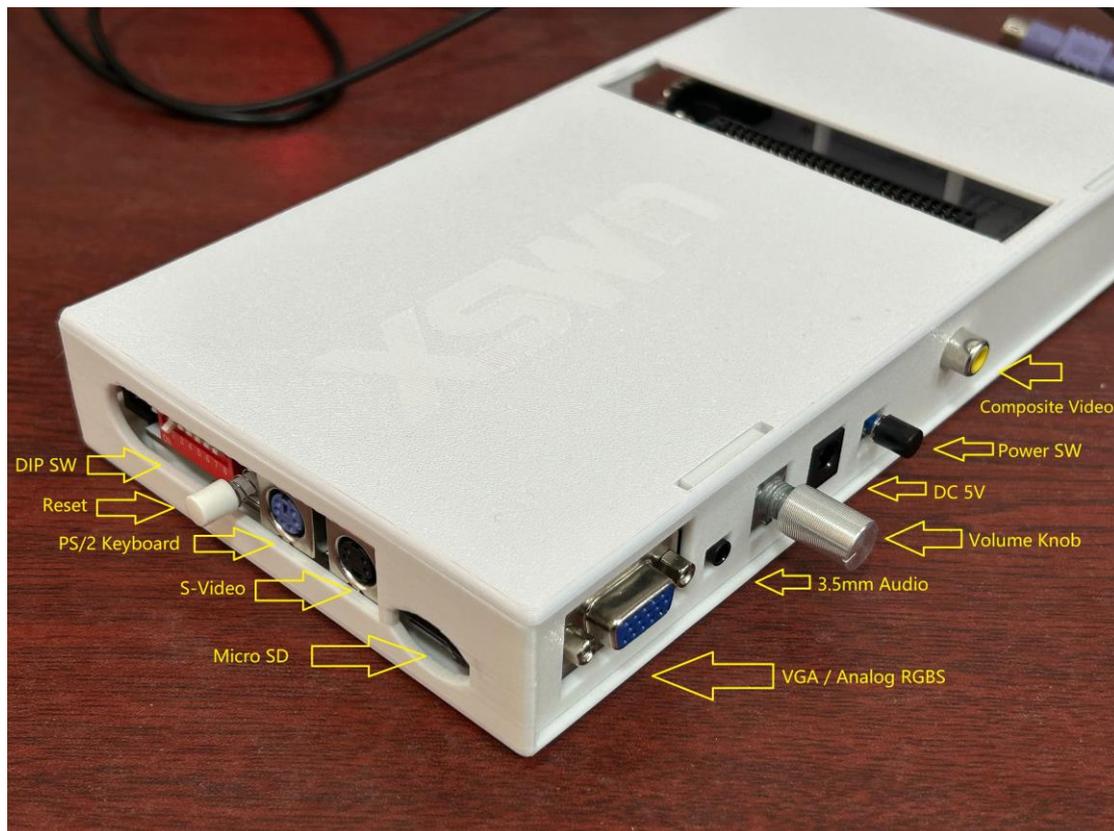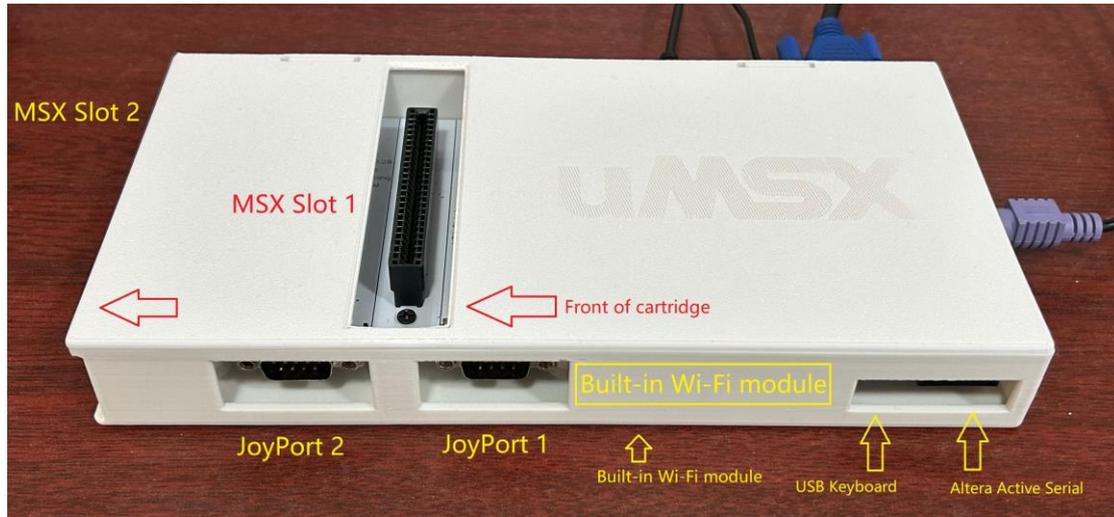# uMSX Pro Rev.3.80

FPGA board MSX2+ compatible.

Updated on 2025.2.24

Designed, produced and sold by Denjhang.

Interface Description:

PRODUCT INFO

The **uMSX** is a MSX FPGA compatible 100% with the MSX2+ standard.

It features VGA/RGB out, composite video out (NTSC/PAL can be switched via smart command), stereo audio output (can be switched via smart command), PS/2 keyboard input, 2 DB9 joystick ports, SD card slot and 2 cartridge slots . The unit has a small form factor, about 150x200 mm, and it comes in a Acrylic case or PLA/PETG Case.

At the same time, uMSX also supports a special WI-FI Dongle, which is fully compatible with the UNAPI standard and can wirelessly access MSXHUB and Gopher Network.

The latest version of OCM-PLD v3.9.2 Alpha adds a new hardware VGA scan line function to make VGA images more retro.

Internally, the **uMSX** also features SCC+ sound, FM sound, selectable 2 or 4 Mb RAM mapper, and turbo mode (5,37mhz/8,06mhz). Each cartridge slot can be also configured as internal MegaSCC+.
You can connect almost any PS/2 keyboard and MSX compatible joysticks (DB9). The unit also includes a SD slot that can be used as mass storage device through BASIC or MSXDOS command line.

uMSX uses Official MSX++ systems, MSX++ computer is a 1chipMSX machine equipped with OCM-PLD firmware upgrade.
Special thanks to KdL for their long-term development of OCM-PLD and their support to me, and also to all the firmware developers.
Also thanks to all uMSX buyers, it is you who made uMSX.

Next I plan to improve uMSX, complete the design of u2-SX series hardware, and invest in the development of uMSX Tablet/Laptop.

TECH SPECS

- 1ChipMSX Clone (OCM 1st Gen), MSX2+ compatibility.
- Altera Cyclone EP1C12Q240C8N FPGA.
- MT48LC16M16A2 32Mb SRAM.
- KdL OCM firmware compatible (ver. 3.9.2 alpha11).
- Smart command support.
- 2x standard MSX Cartridge Slot Connectors .
- 1x microSD Card Slot .
- D-Sub 15 VGA/RGB video output.
- FPGA-generated VGA scan lines.
- RCA composite video output (NTSC).
- S-Video Output.
- 3.5mm jack stereo audio output.
- NE5532 pre-audio amplifier.
- Volume adjustment knob.
- PS2 keyboard port.
- 2x DB9 joystick port.
- DC 5.5*2.1 connector for power supply 5V.
- Fully assembled Acrylic/PLA/PETG case.
- WI-FI Dongle(UNAPI).

After I modified and optimized it, I added many functions:

1. Fix the power switch on the motherboard and use a reliable self-locking switch to get rid of the instability caused by the two pin headers of version 3.5.
2. ESP-01/01S WI-FI dongle (support 2.4G wireless Internet access),
3. USB keyboard interface (PS2 protocol),
4. The second handle interface (JoyStick Port 2),
5. MSX analog RGB video interface, S-Video Output
6. Two upright MSX expansion card slots with dust covers.
7. Add a pre-audio amplifier to support volume adjustment
8. Restore S-Video port and experience retro videos.
9. Self-ejecting SD card slot for better experience.
10. The interface layout has been improved. Compared with the original uMSX Rev.3.5, the VGA interface position is more reasonable (at the rear).
11. Improved VGA display quality and avoided color deviation and interference.
12. FPGA-generated VGA scan lines can be adjusted to 4 densities using smart commands.
13. True love for MSX, I carefully tested every function of every uMSX.
14. Listen patiently to buyers' suggestions and continuously improve products.

Disclosure: Because the way video signal is generated the image could present light vertical bars across the screen, depending on the monitor and selected video output. This behaviour is most noticeable on flat panel monitors receiving RGB/composite signal.

Please do not directly connect the Sega Genesis/ Mega Drive Joystick to uMSX, you must use the included handle adapter to connect to uMSX.

Debugging videos of all products will be uploaded to Bilibili:
https://space.bilibili.com/623253809?spm_id_from=333.337.0.0
This is my Github homepage, with many of my original projects:
https://github.com/denjhang
This is my twitter homepage:
https://twitter.com/tzvyrkn734834
Here is my YouTube homepage:
https://www.youtube.com/channel/UCyTAYLpruW48R6R_JJHUYOA
My Email:
676420807@qq.com
ltj825152013@gmail.com

The red DIP switch is used to control important functions, please refer to the figure below for details:

Switch	Function	Setting	
SW1	CPU Speed	OFF	CPU 3.58Mhz
		ON	CPU 8.06Mhz -TurboPANA 5.37Mhz -Turbo Mega SD enabled
SW2/SW3	Video Output	OFF/OFF	Composite Video/S-Video (NTSC, 60hz)
		OFF/ON	RGB (through VGA connector).
		ON/OFF	VGA 31khz/60Hz
		ON/ON	VGA w/ scanlines, 31Khz/60Hz
SW4	SLOT 1 Config	OFF	External slot 1 enabled
		ON	internal MEGASCC+ (1Mb) enabled External slot 1 disabled
SW5/SW6	SLOT 2 Config	OFF/OFF	External slot 2 enabled
		OFF/ON	internal ESE MegaRAM 1Mb (ASCII 8Kb BANK). External slot 2 disable
		ON/OFF	internal ESE MegaSCC+ 1Mb. External slot 2 disable
		ON/ON	internal ESE MegaRAM 1Mb (ASCII 16Kb BANK). External slot 2 disable
SW7	RAM Mapper	OFF	2Mb internal RAM mapper
		ON	4Mb internal RAM mapper
SW8	SD Card Slot	OFF	Disabled
		ON	Enabled

Warning!! Do not alter DIP switches settings while the unit is powered on!! DOING SO MIGHT DAMAGE THE UNIT

Keyboard

The uMSX supports standard PC PS/2 keyboards.

All the uMSX functions and settings are accessible through key stokes andshortcuts. Special MSX keys (STOP, GRAPH, etc) are mapped to PC keyboard as well:

PC Key/ Combo	Function
END	MSX STOP Key
ALT	MSX GRAPH Key
WIN	MSX SPACE Key
F6	MSX GRAPH Key
F7	MSX KANA Key
F8	MSX SELECT Key
F9	Increase PSG volume
SHIFT + F9	Decrease PSG volume
F10	Increase SCC volume
SHIFT + F10	Decrease SCC volume
F11	Increase FM volume
SHIFT + F11	Decrease FM volume
PAGE UP	Increase overall volume
PAGE DOWN	Decrease overall volume
F12	Changes CPU speed between 3.58MHz, 5.37MHz and 8.06MHz
PRINTSCREEN/ SHIFT + PRINTSCREEN	Changes video output CVBS/S-Video, SCART, VGA 31KHz, VGA+ 31KHz
SCROLL LOCK	Enable/disable tape input mode
SHIFT + F12	Toggles SLOT 1 configuration external/SCC+
SHIFT + SCROLL LOCK	Toggles SLOT 2 configuration external/ASCII8/SCC+/ASCII16

Status LEDs

There are 9 LEDs on board to show the status of different uMSX configurations.LEDs will turn ON/OFF depending on a setting being enabled or disabled. Also,while adjusting volume the LEDs will show the level (from 1 to 9) of the volume.

LED	Status	
1	Flashing	SD activity. Flash memory activity
2	ON	4Mb RAM Mapper
	OFF	2Mb RAM Mapper
3/4	OFF/OFF	External SLOT 2 Enabled
	OFF/ON	ESE-MegaRAM ASCII 8K
	ON/OFF	ESE-MegaSCC+
	ON/ON	ESE-MegaRAM ASCII 16K
5	OFF	External SLOT 1 Enabled
	ON	ESE-SCC+
6/7	OFF/OFF	Composite Video/S-Video output
	OFF/ON	15khz RGB+Audio through VGA connector
	ON/OFF	VGA
	ON/ON	VGA with scanlines
8/9	OFF/OFF	Standard 3.58Mhz Clock
	OFF/ON	Turbo 5.37Mhz Clock
	ON/OFF	Turbo 8.06Mhz Clock

Keyboard LEDs are also used to show configuration status:

SCROLL LOCK LED: Tape input ON/OFF

NUM LOCK LED: Kana mode ON/OFF

Attention! DIP switch, keys and LED functions can change if a different firmware isloaded onto the board.