SX1Mini+ User Manual

Tech Specs

- MSX2+ Standard Compatible
- Altera Cyclone EP1C12Q240C8N FPGA
- 2 External Cartridge Slots
- Turbo 5.37 or 8.06 MHz
- Switchable 2/4 Mb RAM Mapper
- MSX-MUSIC Compatible (FMPAC)
- 1 Mb ESE-MegaRAM
- 1 Mb ESE-RAM SCC+
- MicroSD Card Slot for Mass Storage (**FAT16 support only**)
- RGB/VGA 15/31KHz Video Output (50/60Hz)
- Composite Video Output
- PS/2 Keyboard Connector
- 2 DB9 Joystick Ports (MSX compatible)
- 3.5mm Jack Stereo Audio Output
- Selectable Tape Input Mode

Unit overview

What do you need to start using your SX-1 Mini+?

- USB power supply that outputs **at least 2 Amps (2000 mA)**.
- Mini USB cable for power
- Monitor and video cable. Either VGA or RGB-Scart protocolos are supported. (See **DIP Switch Settings** section to select video output settings)
- PS/2 Keyboard
- Optionally, a FAT16 formatted SD card with MSXDOS2 boot files (See **DIP Switch Settings** section to enable the SD slot).

You can plug any MSX compatible cartridge (game cartridges, Floppy/IDE controllers, FlashROM carts, etc are supported).

WARNING!!! Do not plug/unplug any cartridge when the unit is powered. It will very likely damage the unit permanently.

DIP Switch Settings

The DIP switch block is accessible from beneath the unit and can be used to select/configure the various features the **SX1Mini+** offers.

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 (NTSC, 60hz). **See Appendix 1 section.**
		OFF/ON	RGB (through VGA connector).
		ON/OFF	VGA 31khz/60Hz for LED display
		ON/ON	VGA 31Khz/60Hz for CRT
SW4	SLOT 1 Config	OFF	External slot 1 enabled
		ON	ınternal MEGASCC+ (1Mb) enabled External slot 1 disabled
SW5/SW6	SLOT 2 Config	OFF/OFF	External slot 2 enabled
		OFF/ON	ınternal ESE MegaRAM 1Mb (ASCII 8Kb BANK). External slot 2 disable
		ON/OFF	ınternal ESE MegaSCC+ 1Mb. External slot 2 disable
		ON/ON	ınternal 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

Keyboard

The **SX1Mini+** supports standard PC PS/2 keyboards. All the **SX1Mini+** functions and settings are accessible through key stokes and shortcuts. MSX specific 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 **SX1Mini+** 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 momentarily.

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 is loaded onto the board.

Cartridges

ATTENTION!! DO NOT INSERT/EXTRACT CARTRIDGES WHILE THE UNIT IS POWERED ON.

External slots on the **SX1Mini+** can be used to plug MSX compatible cartridges. These can be ROM based software cartridges or any hardware add-on cart like FDD/IDE interfaces, FlashROM cartridges, etc. Any cart that works on an original MSX machine should work fine on the **SX1Mini+**.

To enable the external slots make sure the DIP switches are set properly: Switch 4 OFF to activate slot 1, Switches 5 and 6 OFF to activate slot 2.

External Mass Storage

When using external storage devices such as floppy disk controllers or IDE controller cartridges you might need to disable the **SX1Mini+** SD slot to avoid hardware conflicts. To turn off the SD slot set the DIP switch 8 to OFF.

Tape Player

It is possible to use a tape player and MSX cassette tapes to load software into the **SX1Mini+** through the right audio channel. This channel can be configured either as an audio output or tape input by pushing the SCROLL LOCK key on the keyboard. SCROLL LOCK LED on the keyboard is lit to signify tape input is enabled.

Once enabled, you can use the BASIC command line (see the instructions for the particular tape you want to load) to load any tape you like, just like on a “real” MSX machine.

SX1Mini+ SD Card Slot

To enable the **SX1Mini+** internal SD card slot set DIP switch 8 to ON. You can use SD cards formatted as FAT16, max partition size 4GB.

You can use the card directly with the regular MSX BASIC commands (FILES, SAVE, LOAD, etc). The card will be recognised as drive “A”. If there is an external storage interface plugged onto one of the cartridge slots the internal SD will be recognised as drive “C”.

It is also possible to run MSXDOS. In this case you need to copy MSXDOS2.SYS and COMMAND2.COM on the root of the SD card.

Running MSXDOS will allow the use of various tools and utilities as for example ROMLOAD.COM/MGLOCM.COM to load ROM files, SofaRUN to browse and launch files and programs, C compilers, etc. Notice you need to individually download and copy these utilities into the card. We strongly recommend to read the MSXDOS2 user manual to get familiar with all its functions and features.

Firmware Update

The **SX1Mini+** requires a slightly customised KdL firmware to work 100% correctly. We will be releasing firmware updates along with KdL releases. You can find the last release on our Google Drive folder.

It is possible to use KdL “vanilla” firmware but you will get too much gain on the image output.

In case you want to compile your own firmware these are the section of the code you need to change to get the right luminance output for the SX1Mini+:

```
1987                pVideoHS_n  <= 'Z';                         -- CSync Disabled
1988                pVideoVS_n  <= DACout;                      -- Audio Out (Mono)
1989  --            legacy_vga  <= '0';                         -- behaves like vAllow_n        (for V99
1990
1991            when "01" =>                                    -- RGB 15kHz
1992                if( ZemmixNeo = '1')then                    -- Luminance 100%
1993                    pDac_VR     <= "0" & VideoR( 5 downto 1 );
1994                    pDac_VG     <= "0" & VideoG( 5 downto 1 );
1995                    pDac_VB     <= "0" & VideoB( 5 downto 1 );
1996                else                                        -- Luminance 50%
1997                    pDac_VR     <= "0" & VideoR( 5 downto 1 );
1998                    pDac_VG     <= "0" & VideoG( 5 downto 1 );
1999                    pDac_VB     <= "0" & VideoB( 5 downto 1 );
2000                end if;
2001                Reso_v      <= '0';                         -- Hsync:15kHz
2002                pVideoHS_n  <= VideoCS_n;                   -- CSync Enabled
2003                pVideoVS_n  <= DACout;                      -- Audio Out (Mono)
2004  --            legacy_vga  <= '0';                         -- behaves like vAllow_n        (for V99
2005
2006            when others =>                                  -- VGA / VGA+ 31kHz
2007                if( ZemmixNeo = '1')then                    -- Luminance 100%
2008                    pDac_VR     <= "0" & VideoR( 5 downto 1 );
2009                    pDac_VG     <= "0" & VideoG( 5 downto 1 );
2010                    pDac_VB     <= "0" & VideoB( 5 downto 1 );
2011                else                                        -- Luminance 50%
2012                    pDac_VR     <= "0" & VideoR( 5 downto 1 );
2013                    pDac_VG     <= "0" & VideoG( 5 downto 1 );
2014                    pDac_VB     <= "0" & VideoB( 5 downto 1 );
2015                end if;
2016                Reso_v      <= '1';                         -- Hsync:31kHz
2017                pVideoHS_n  <= VideoHS_n;
2018                pVideoVS_n  <= VideoVS_n;
2019  --            legacy_vga  <= not DisplayMode(0);          -- behaves like vAllow_n        (for V99
2020                if( legacy_sel = '0' )then                  -- Assignment of Legacy Output  (for V99
2021                    legacy_vga  <= not DisplayMode(0);      -- to VGA
2022                else
2023                    legacy_vga  <= DisplayMode(0);          -- to VGA+
2024                end if;
2025
2026            end case;
2027        end if;
2028    end process;
```

The idea is to compile a Zemmix firmware with 50% luminance.

Appendix 1

Composite video signal is available on pin 3 of the VGA connector when switches 2 and 3 are OFF.

On later **SX1Mini+** units (units shipped from October 2020 on) you can also route this signal through the audio jack output and use a **TRRS jack to RCA adapter** to get the signal to your TV. On said **SX1Mini+** units there is an extra switch on the bottom of the case which, when ON, will send the composite signal to the audio jack.

When using VGS/RGB output **composite video switch must be always OFF**, otherwise it will interfere with the video signal.

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