MSX-EQ PSG Spectrolyzer for MSX

Developer: Pyhesty [RBSC]. Copyright (C) 2022

Русская версия находится здесь: MSX-EQ PSG Spectrolyzer для платформы MSX

The MSX-EQ PSG Spectrolyzer is a simple cartridge for the MSX platform that visualizes the spectrum of notes played by the programmable sound generator, such as the AY-3-8910 or YM2149 (PSG). The cartridge board is intended for the standard MSX cartridge slot. The board shows the effect of measuring the signal's level, in which each reproduced frequency (or frequency range) corresponds to one of 9 vertical LED indicators.

The MSX-EQ cartridge is based on the PLD Altera EPM7128, that has 128 logical units. The PLD intercepts PSG port I/O, identifies the played note/frequency and displays its representation on the dedicated LED indicator. The cartridge doesn't need any special setup. It can be installed into any standard MSX slot that allows an unobstructed view of the cartridge's LED indicators.

The cartridge visualizes the played notes/frequencies in games and demos in real time. After a note/frequency fades out, the LED indicators automatically switch off.

The cartridge may be assembled in 2 different ways:

1. With discrete LED elements - simple, but allowing various color combinations
2. With LED assemblies - the so-called "bars", mostly single-colored

The following color combinations are possible (those were tested and were found suitable for the project, however other color combinations are possible):

- One color LEDs or LED assemblies: blue, red or green
- Multi-colored LEDs or LED assemblies: blue with red or green with red (red LEDs are placed on top)

Circuit

MSX-EQ PSG Spectrolyzer Cartridge
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Developer: Pyhesty
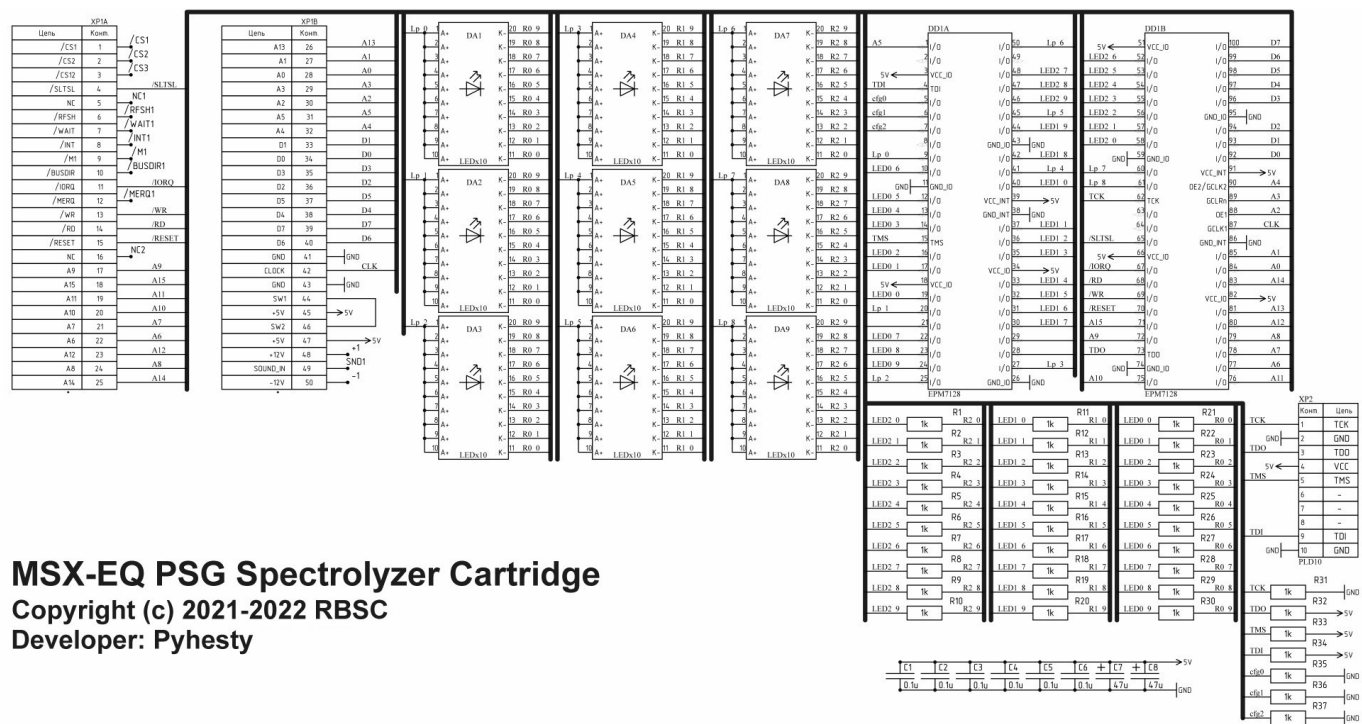
Front side of the PCB:
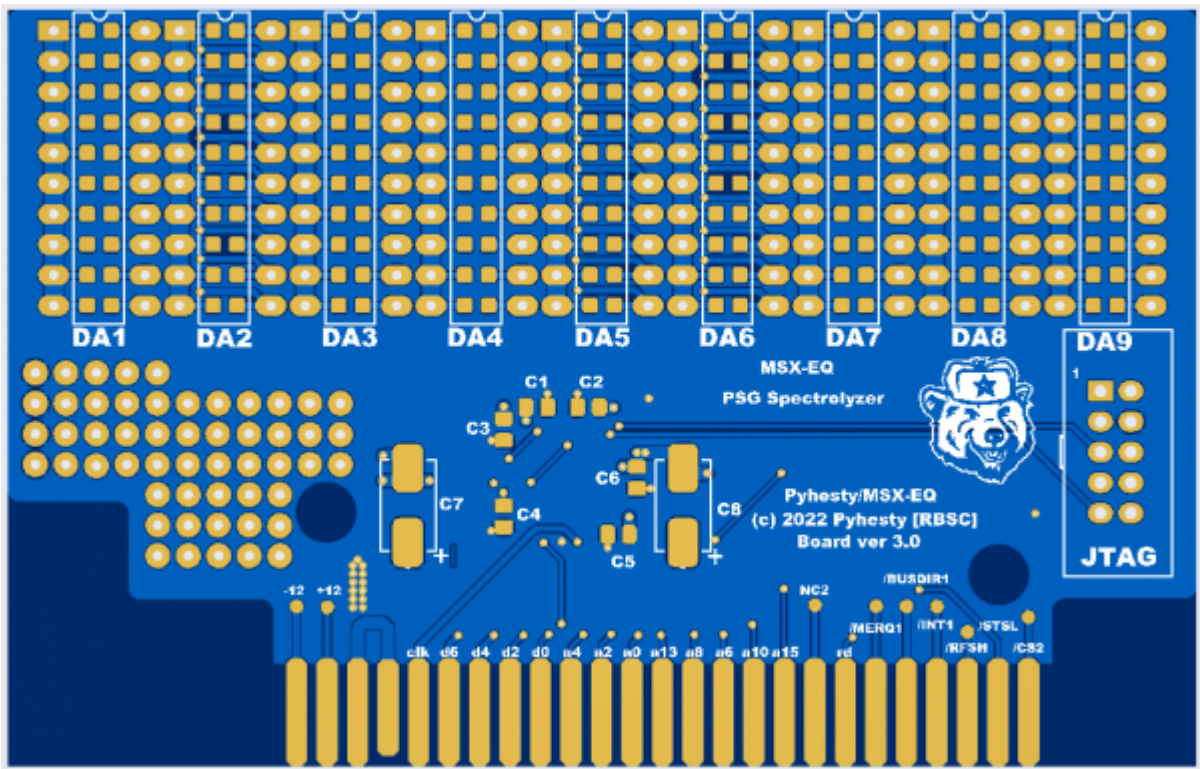
[Gerber format files](#)

All parts for assembling the MSX-Eq cartridge can be purchased from varios sellers on AliExpress:

Part	Value	Count	Note
C1..C6	100nF	6	C0805
C7..C8	47uF 10v	2	CPOL-EUSMCB SMC_B
DA1..DA9	LEDs	9	2010BB DIP-8

Part	Value	Count	Note
D1	EPM7128STC100	1	TSOP-100
R1..R37	1k	37	R0805
XP2	PLD10	1	PIN-10
MSXSLOT	EDGE-CONNECTOR	1	50-pin slot

🔴 LED assemblies

Firmware uploading

The freshly-assembled MSX-EQ cartridge needs the firmware to be uploaded into the PLD chip. For updating/uploading the firmware into the cartridge you will need:

1. Quartus II Web Edition (Free) 15.0 software
2. Byte Blaster or USB Blaster programmer (can be purchased on Ebay or AliExpress)

The procedure is simple — supply 5v onto the cartridge board, connect the USB Blaster to the JTAG connector's placeholder (mind the orientation of the connector!). Auto–detect the Altera chip with Quatrus software and then upload the POF file from the "Firmware" folder into the PLD chip.

> ⚠️ If the LED assemblies with inverted polarity were used to assemble the cartridge, please use the "MSX_EQ_inv_led.pof" firmware instead of the standard one.

Cartridge case

Any factory-made MSX cartridge manufactured from semi-transparent or transparent plastic is suitable for the MSX-EQ cartridge board.

For example, the following quality MSX cartridge cases can be obtained from Overrich (South Korea) and Retro Game Restore (Taiwan):

- https://retrogamerestore.com/store/msx_cart_shell/
- https://www.msx.org/news/en/black-white-and-transparent-msx-cartidge-cases-overrich

Also, there's a 3D model of the cartridge case. The case should be printed with semi-transparent filament.

3D model of the cartridge case files:

- Top
- Bottom

Visual Effects

You can check how the cartridge visualizes various PSG effects by watching these videos:

- Games
- Demo 1
- Demo 2

Disclaimer

All files of the MSX-EQ project are available in the RBSC's Github repository: here.

Link to the official website

> The RBSC provides all the files and information for free, without any liability. The provided information, software or hardware must not be used for commercial purposes unless permitted by the RBSC. Producing a small amount of bare boards for personal projects and selling the rest of the batch is allowed without the permission of RBSC.
>
> When the sources of the tools are used to create alternative projects, please always mention the original source and the copyright!

Links

Discussion on msx.org

MSX Spectrolyzer - New flashy project from RBSC

http://sysadminmosaic.ru/en/msx/msx-eq/msx-eq

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