Project Documentation

Commodore: 23128 Adapter Passive

Project number: 168

Revision: 0

Date: 29.10.2020

Commodore: 23128 Adapter Passive Rev. 0

Module Description

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Introduction

This board serves for adapting an EPROM type 27C128, 27C256 or 27C512 to a 23128 ROM socket. This is useful for e.g. for the Commodore C16 Kernal or the Kernal/Basic ROM of the C64.

A 27C256 or 27C512 fits 32k or 64k, which the size of the 23128 ROM is 16k. The selected 16k bank can be configured with a jumper JP1. A set jumper is LOW, an open jumper is HIGH.

Signal	Pin	Pin	Signal
A14	1	2	GND
A15	3	4	GND
+5V	5	6	n.c.

Table 1: Jumper (JP1) for Bank Selection

n.c. is not connected. The purpose of the +5V pin is providing supply voltage to a micro controller or logic circuit for switching between the Kernals.

JP1 can be configured with solder bridges, a pin header and jumpers are not required for a fix configuration.

There are jumpers (JP2, JP4 and JP4) for the chip select of the 23128 on the bottom side of the board. These are configured correctly already, see the schematics for more information. Only one of those should be closed. They are for future use.

Bank Selection

The desired KERNAL (or other binary content) is selected at JP1. For the pinout refer to Table 1. The jumper is installed (vertically) in a way, that it connects the address line with the GND potential.

A15	A14	16k Block	Addr. Offset
set	set	#0	0x0000
set	open	#1	0x4000
open	set	#2	0x8000
open	open	#3	0xC000

Table 2: Selection of EPROM memory blocks

A set jumper corresponds to a LOW level (binary 0), an open jumper to a HIGH level. The EPROM Offset Address and the C16/C64 address must not be confused.

Dimensions

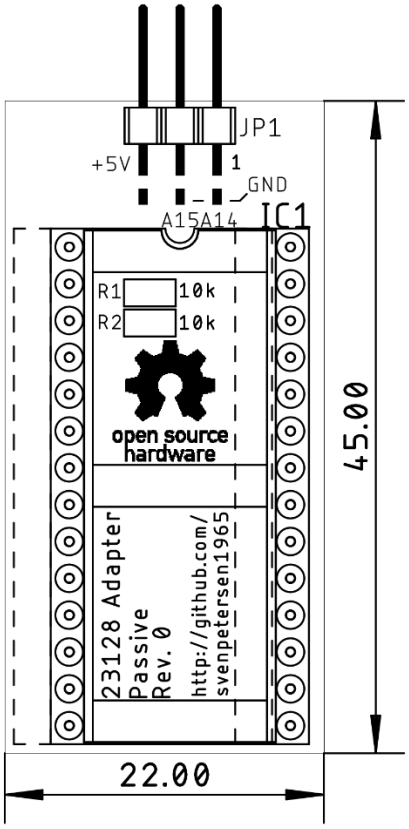


Figure 1: Dimensions

Sources for BASIC and KERNAL for the C16

The content of the BASIC ROM (The BASIC ROM fits this adapter, too) and the KERNAL ROM can be found here:

http://www.zimmers.net/anonftp/pub/cbm/firmware/computers/c64/index.html

There are different Kernals for PAL and for NTSC machines. Be aware that you need the one, that fits your C16.

The popular JiffyDOS is still a commercial product and can be acquired for little money from

http://www.go4retro.com/ or https://restore-store.de/

Compatibility of EPROMs

It is recommended to use 27C512 EPROMs only. The smaller EPROM Types 27C256 and 27C128 might conflict with accessing the BASIC 8k slot. The unused address signals will be tied LOW while this access. This means, VPP will be approximately 0V and /PGM will be LOW. This is a not recommended setting.

27C128									
	27C256								
		27C512							
			SOCKET						
VPP	VPP	A15	1	A15	VCC	28	VCC	VCC	VCC
A12	A12	A12	2	A12	A14	27	A14	A14	/PGM
A7	A7	A7	3	A7	A13	26	A13	A13	A13
A6	A6	A6	4	A6	A8	25	A8	A8	A8
A5	A5	A5	5	A5	A9	24	A9	A9	A9
A4	A4	A4	6	A4	A11	23	A11	A11	A11
A3	A3	A3	7	A3	/OE	22	/G/Vpp	/G	/G
A2	A2	A2	8	A2	A10	21	A10	A10	A10
A1	A1	A1	9	A1	GND	20	/E	/E	/E
A0	A0	A0	10	A0	D7	19	D7	D7	D7
D0	D0	D0	11	D0	D6	18	D6	D6	D6
D1	D1	D1	12	D1	D5	17	D5	D5	D5
D2	D2	D2	13	D2	D4	16	D4	D4	D4
GND	GND	GND	14	GND	D3	15	D3	D3	D3

Table 3: EPROM pin compatibility

EPROM	Size	A15	A14
27C512	64kx8	yes	yes
27C256	32kx8	HIGH	yes
27C128	16kx8	HIGH	HIGH

Table 4: Settings per EPROM type

In case VPP is located at a dedicated pin (pin 1), A15 has no effect anymore. A HIGH level is recommended (switch is off). The /PGM Pin should be set HIGH. The n.c. (not connected) pin should be HIGH (with pull-up) or open.

Using parallel EEPROMs

There are ***parallel*** EPROMs, which fit into the EPROM sockets. They do not require erasing with a UV eraser, like EPROMs, but the price is higher.

Since they can be written, which is controlled by the $\overline{WE}$ signal, but the Super Expander II cartridge is lacking of this functionality, this signal has to be HIGH (inactive). The 28C256 has the A14 signal connected to Pin 1, which is A15 of the EEPROM socket. This is no problem, but it has to be kept in mind, that the jumper for A15 has effect on the bank select A14 of the EPROM.

28C256					
	SOCKET				
A14	1	A15	VCC	28	VCC
A12	2	A12	A14	27	/WE
A7	3	A7	A13	26	A13
A6	4	A6	A8	25	A8
A5	5	A5	A9	24	A9
A4	6	A4	A11	23	A11
A3	7	A3	/OE	22	/G/Vpp
A2	8	A2	A10	21	A10
A1	9	A1	GND	20	/E
A0	10	A0	D7	19	D7
D0	11	D0	D6	18	D6
D1	12	D1	D5	17	D5
D2	13	D2	D4	16	D4
GND	14	GND	D3	15	D3

Table 5: EEPROM pin compatibility

EEPROM	Size	A15	A14
28C256	32kx8	=A14	OPEN

Table 6: Settings per EEPROM type

Installation

The 23128 Adapter can be installed on a C64 short board (for BASIC and Kernal) or a C16 (C264 family) in the Kernal socket (U4) or the BASIC socket (U3). The notch that marks the direction of the socket and on the EPROM have to point in the same direction.

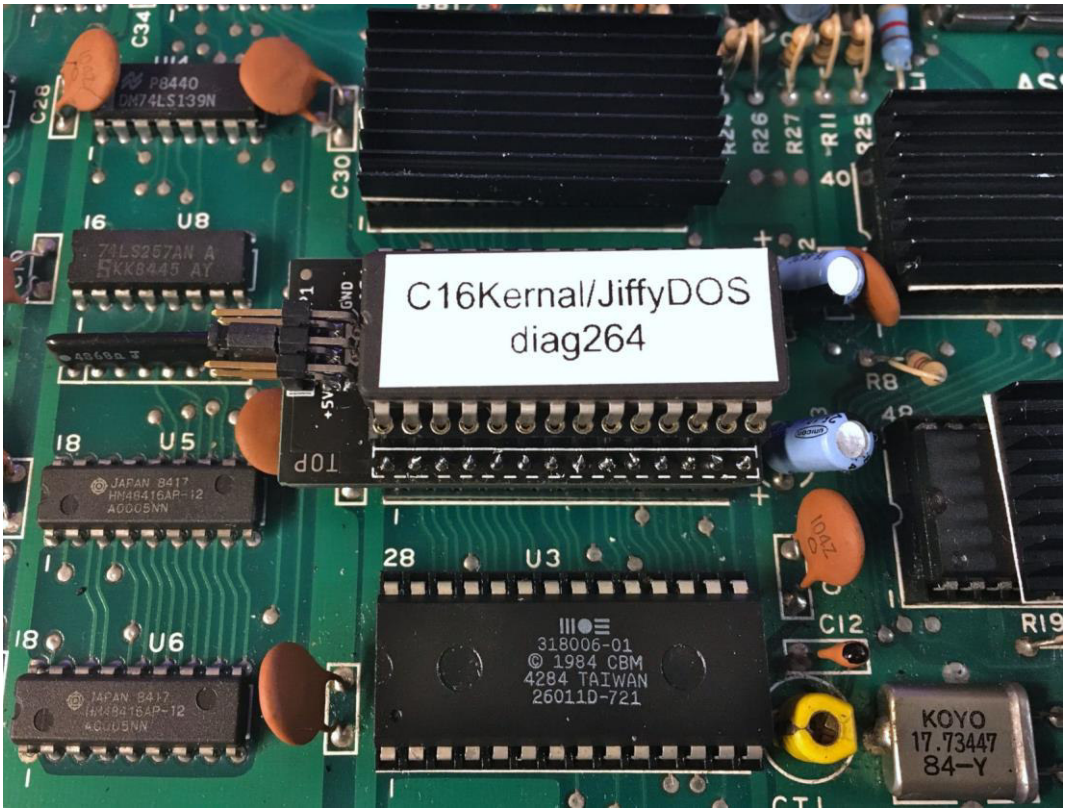
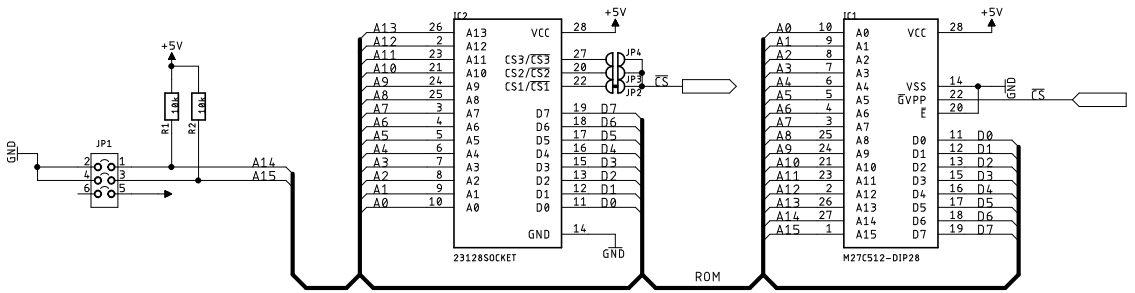


Figure 2: The 23128 Adapter installed in the U4 Kernals socket on a C16 board

Revision History

Rev. 0

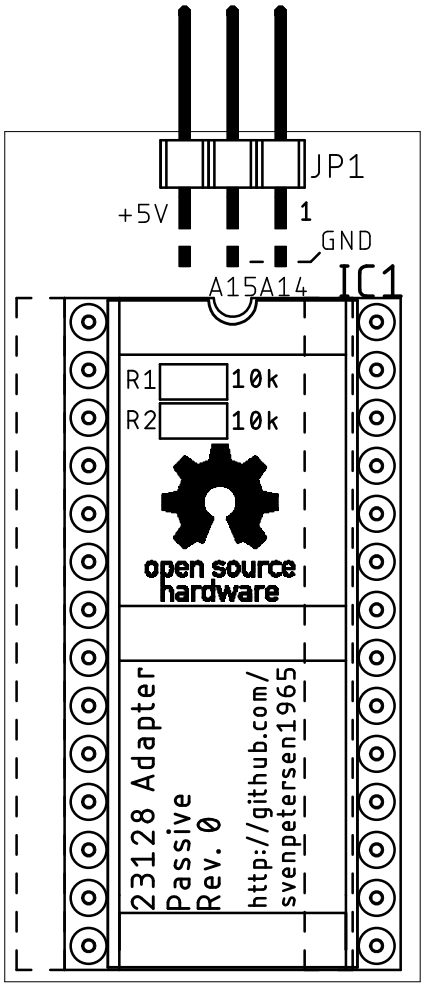
- Fully functional prototype



open source hardware

Title: 23128 ROM Adapter Passive		Doc.-No.: 168-1-001-00	
		Draft.: Sven Petersen	
Date: 29.10.2020 14:47		Rev.: 0	Page 1/1
File: 23138_adapter_passive			
http://github.com/svenpetersen1965			A3

Sven Petersen 2020	Doc.-No.: 168-2-01-00	
	Cu: 35µm	Cu-Layers: 2
23138_adapter_passive		
29.10.2020 14:50		Rev.: 0
placement component side		



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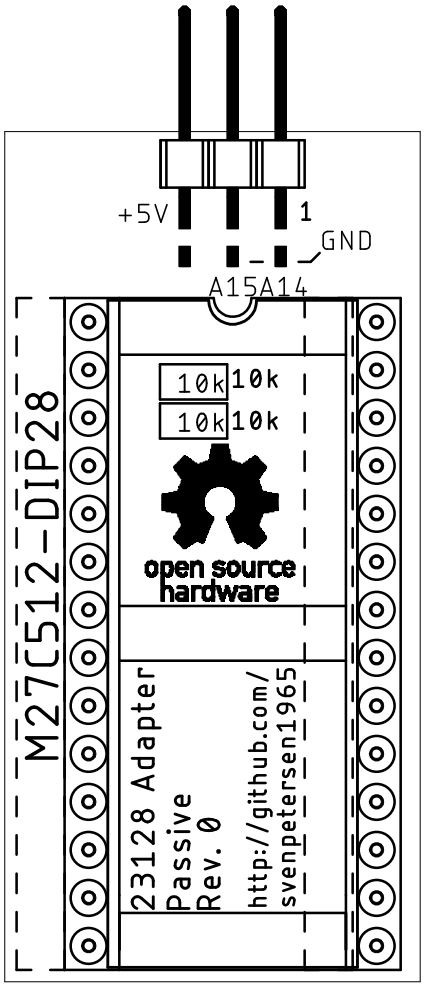

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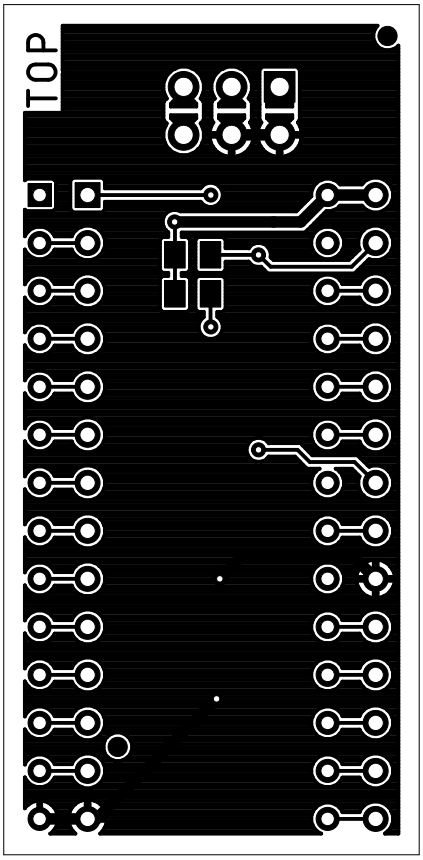

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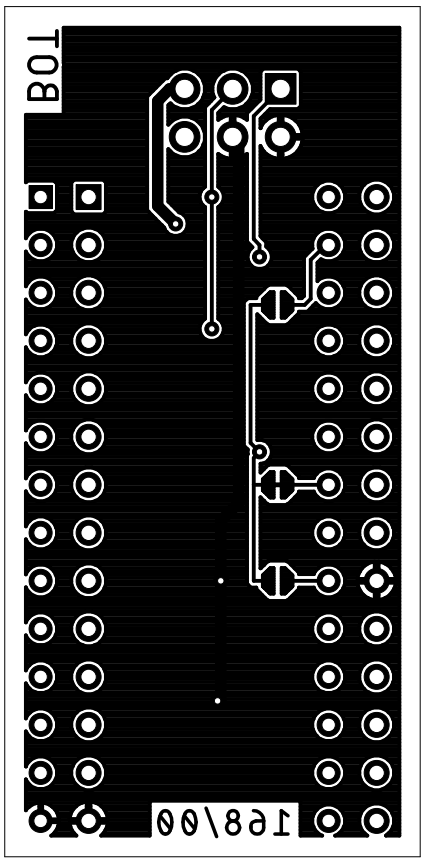

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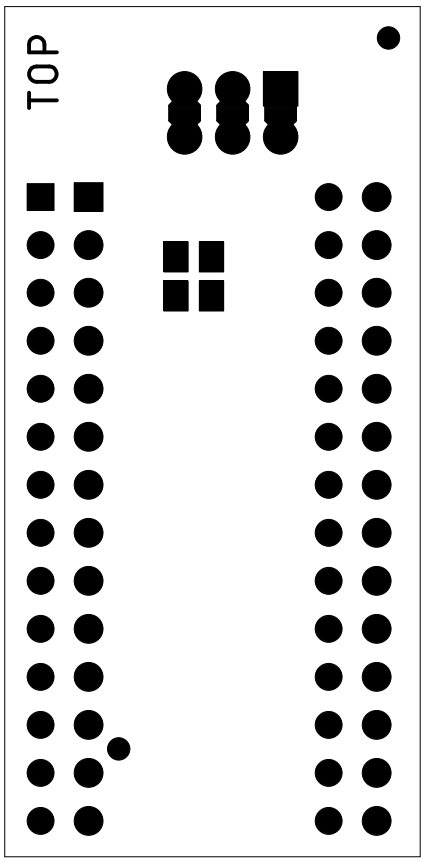
stopmask component side		



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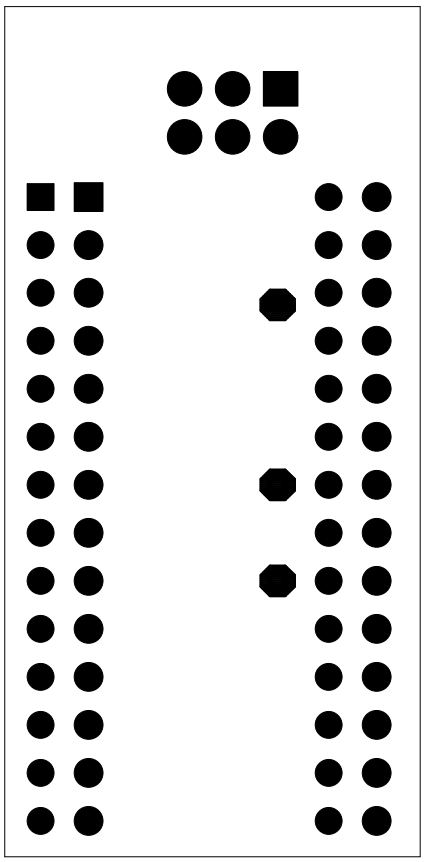

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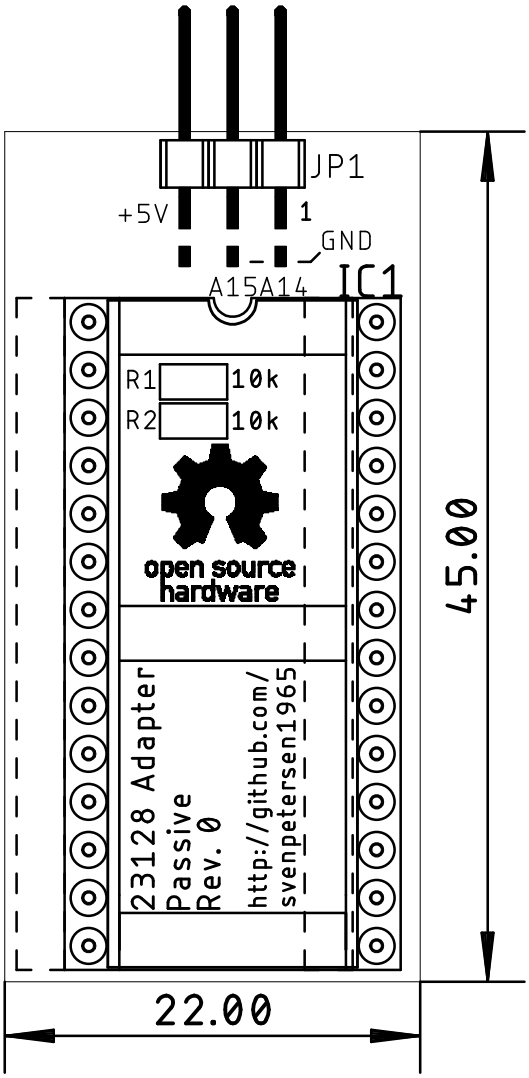
29.10.2020 14:50		Rev.: 0
placement component side measures		



Commodore: 23128 Adapter Passive Rev. 0

Test

Test Setup

The passive 23128 Adapter (Rev. 0) was tested in a Commodore C16 (ASSY 250443 Rev B). An ST M27C512 EPROM with the following binaries was installed:

Offset Address	Memory Bank	Binary
$0000	0	Commodore PAL Kernal (318004-05)
$4000	1	JiffyDOS 6.01 for C16 (PAL)
$8000	2	Diag264 (PAL)
$C000	3	empty

Test Execution

The C16 was powered down for setting the jumpers, the jumpers were set and the C16 was powered up again.

Jumpers JP1	Boots to	Testing
A14 and A15	Normal Kernal	ok
A15 only	JiffyDOS	ok
A14 only	Diag264	ok

The Kernals were tested, no problems have occurred. All configuration addresses are effective.

Conclusion

The 23128 Adapter is fully functional.

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Bill of Material Rev. 0.0

Pos.	Qty	Value	Footprint	Ref.-No.	Comment
1	1	168-2-01-00	2 Layer	PCB Rev. 0	2 layer, Cu 35μ, HASL, 45.0 x 22.0, 1.6mm FR4
2	2	10k	0805	R1, R2	SMD resistor, 10% or better
3	1	two Pinstrip, precision round pins, cut to 14 pins length	DIL28_SOCKET	(IC2)	Precision Round pins mandatory! E.g. Reichelt BKL 10120540 or
4					10PCS Single Row 40Pin 2.54mm Round Male Pin Header machined
5	1	2x03pin/90°	COMBI-3X2W	JP1	90° pin header, 2.54mm pitch. E.g. Reichelt MPE 088-2-006, not required for fix configuration
6	2	Jumper	2.54mm	(JP1)	Jumpers for address selection (in case it is intended to jumper the kenal selection)
7	1	DIP28 socket	DIL28-6	(IC1)	Precision round pin is recommended