Bus

File: Bus.kicad_sch

CPU, FPGA, FRAM

File: CPU,_FPGA,_FRAM.kicad_sch

Power

File: Power.kicad_sch

A/V

File: A%2fV.kicad_sch

USB

File: USB.kicad_sch

VRAM, DAC

File: VRAM,_DAC.kicad_sch

PETIO

File: PETIO.kicad_sch

SID

File: SID.kicad_sch

SID Power

File: SID_Power.kicad_sch

Mixer

File: Mixer.kicad_sch

Keylock

File: Keylock.kicad_sch

Smallbus

File: Smallbus.kicad_sch

UART

File: UART.kicad_sch

Userport

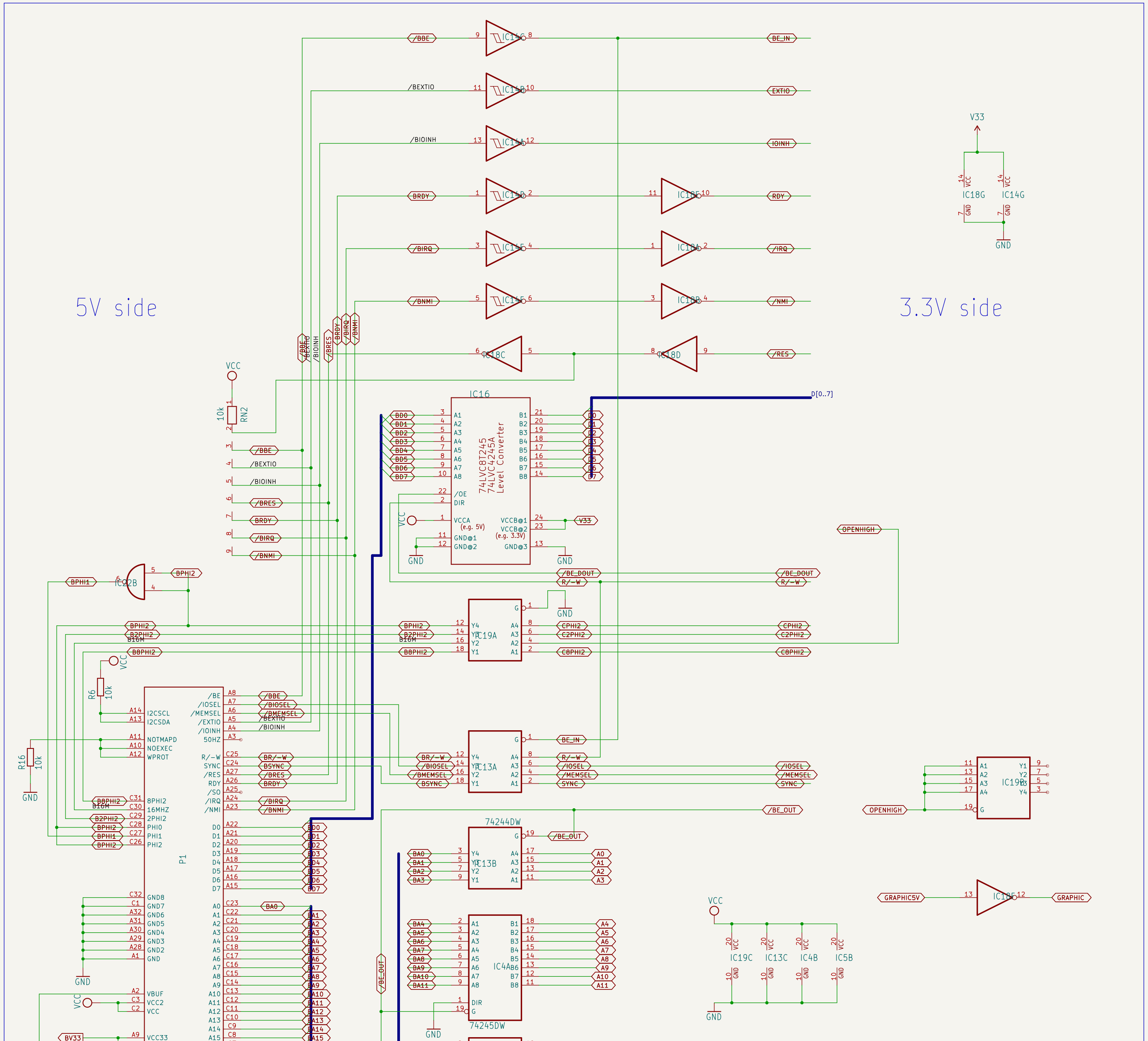
File: Userport.kicad_sch

FastIEC

File: FastIEC.kicad_sch

I2C,UEXT

File: I2C,UEXT.kicad_sch



1.0B:
- Removed the pullup on GRAPHIC, as it's now in the FPGA
1.2A:
- use V33IO for bus 3.3V (if so jumpered)

CBM-ULTIPET-V1.3A
(C) A. Fachat

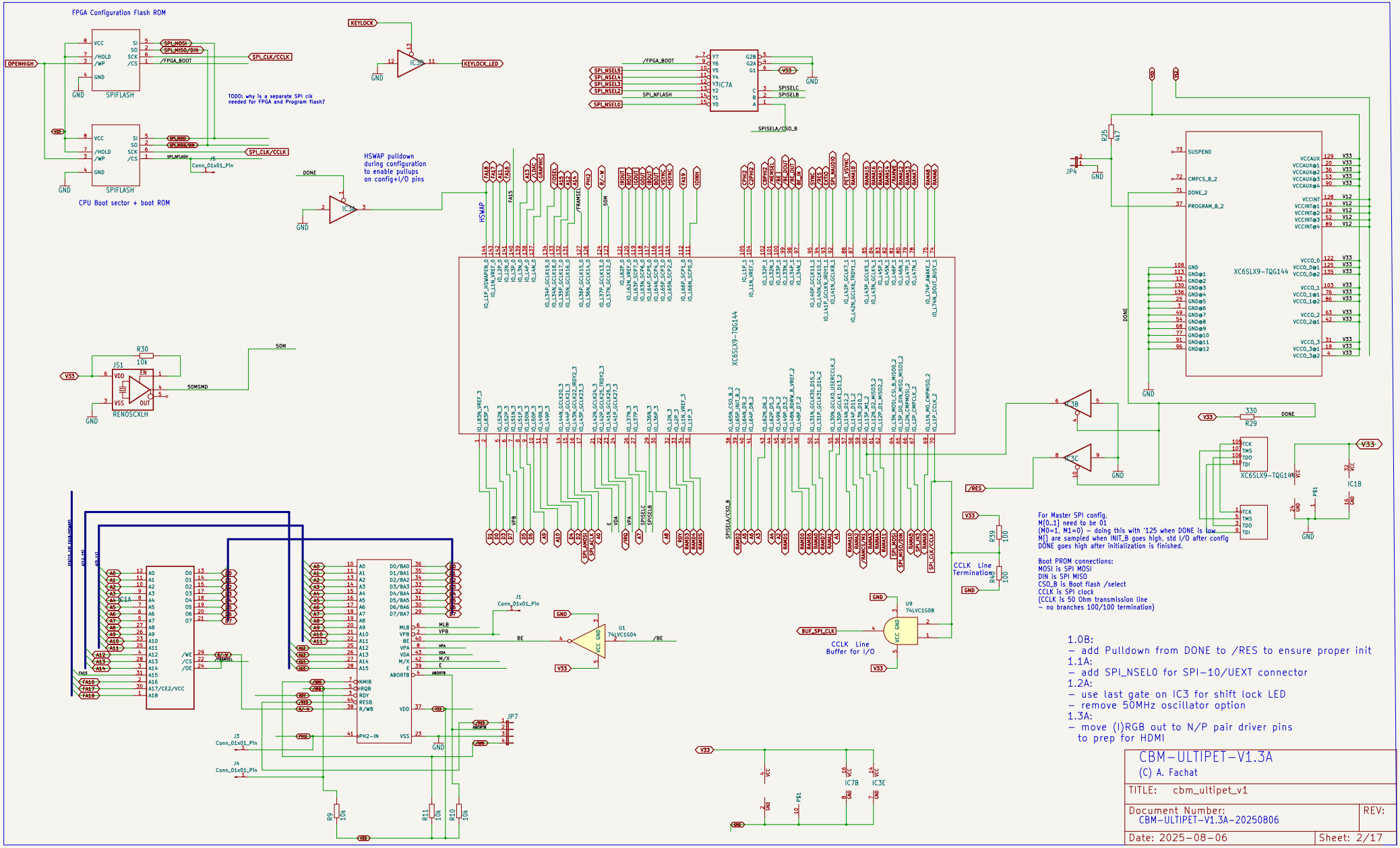
TITLE: cbm_ultipet_v1

Document Number: CSA-ULTIPET-V1.2A-20241010

REV:

Date: 2025-08-06

Sheet: 1/17


FPGA Configuration Flash ROM
SPIFLASH
CPU Boot sector + boot ROM
TODO: why is a separate SPI clk needed for FPGA and Program flash?
HSWAP pulldown during configuration to enable pullups on config+I/O pins
XC6SLX9-TQG144
RENOSCXLH
74LVC1G08
74LVC1G04
For Master SPI config,
M[0..1] need to be 01
(M0=1, M1=0) - doing this with '125 when DONE is low
M[] are sampled when INIT_B goes high, std I/O after config
DONE goes high after initialization is finished.
Boot PROM connections:
MOSI is SPI MOSI
DIN is SPI MISO
CSO_B is Boot flash /select
CCLK is SPI clock
(CCLK is 50 Ohm transmission line
- no branches 100/100 termination)
CCLK Line Termination
CCLK Line Buffer for I/O
1.0B:
- add Pulldown from DONE to /RES to ensure proper init
1.1A:
- add SPI_NSEL0 for SPI-10/UEXT connector
1.2A:
- use last gate on IC3 for shift lock LED
- remove 50MHz oscillator option
1.3A:
- move (!)RGB out to N/P pair driver pins
to prep for HDMI
CBM-ULTIPET-V1.3A
(C) A. Fachat
TITLE: cbm_ultipet_v1
Document Number: CBM-ULTIPET-V1.3A-20250806
REV:
Date: 2025-08-06
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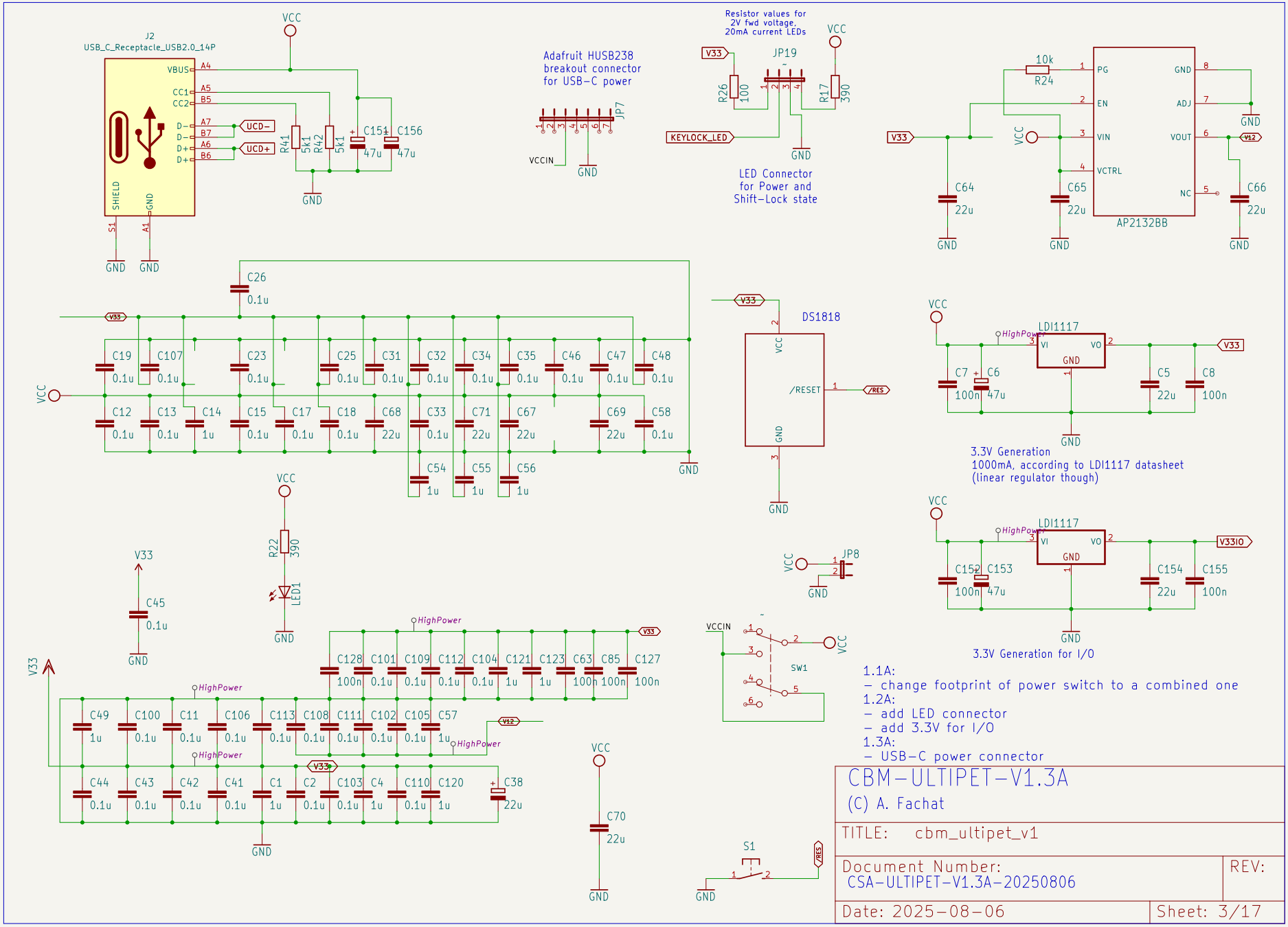
J2
USB_C_Receptacle_USB2.0_14P
VBUS
CC1
CC2
D-
D-
D+
D+
SHIELD
GND
UCD-
UCD+
R41 5k1
R42 5k1
C154 47u
C156 47u
Adafruit HUSB238
breakout connector
for USB-C power
JP7
VCCIN
Resistor values for
2V fwd voltage,
20mA current LEDs
JP19
R26 100
R17 390
KEYLOCK_LED
LED Connector
for Power and
Shift-Lock state
R24 10k
PG
EN
VIN
VCTRL
GND
ADJ
VOUT
NC
AP2132BB
C64 22u
C65 22u
C66 22u
C26 0.1u
C19 0.1u
C107 0.1u
C23 0.1u
C25 0.1u
C31 0.1u
C32 0.1u
C34 0.1u
C35 0.1u
C46 0.1u
C47 0.1u
C48 0.1u
C12 0.1u
C13 0.1u
C14 1u
C15 0.1u
C17 0.1u
C18 0.1u
C68 22u
C33 0.1u
C71 22u
C67 22u
C69 22u
C58 0.1u
C54 1u
C55 1u
C56 1u
DS1818
/RESET
/RES
LDI1117
HighPower
VI
VO
C7 100n
C6 47u
C5 22u
C8 100n
3.3V Generation
1000mA, according to LDI1117 datasheet
(linear regulator though)
C152 100n
C153 47u
C154 22u
C155 100n
3.3V Generation for I/O
R22 390
LED1
C45 0.1u
JP8
SW1
C128 100n
C101 0.1u
C109 0.1u
C112 0.1u
C104 0.1u
C121 1u
C123 1u
C63 100n
C85 100n
C127 100n
C49 1u
C100 0.1u
C11 0.1u
C106 0.1u
C113 0.1u
C108 0.1u
C111 0.1u
C102 0.1u
C105 0.1u
C57 1u
C44 0.1u
C43 0.1u
C42 0.1u
C41 0.1u
C1 1u
C2 0.1u
C103 0.1u
C4 1u
C110 0.1u
C120 1u
C38 22u
C70 22u
S1
1.1A:
– change footprint of power switch to a combined one
1.2A:
– add LED connector
– add 3.3V for I/O
1.3A:
– USB-C power connector
CBM-ULTIPET-V1.3A
(C) A. Fachat
TITLE: cbm_ultipet_v1
Document Number:
CSA-ULTIPET-V1.3A-20250806
REV:
Date: 2025-08-06
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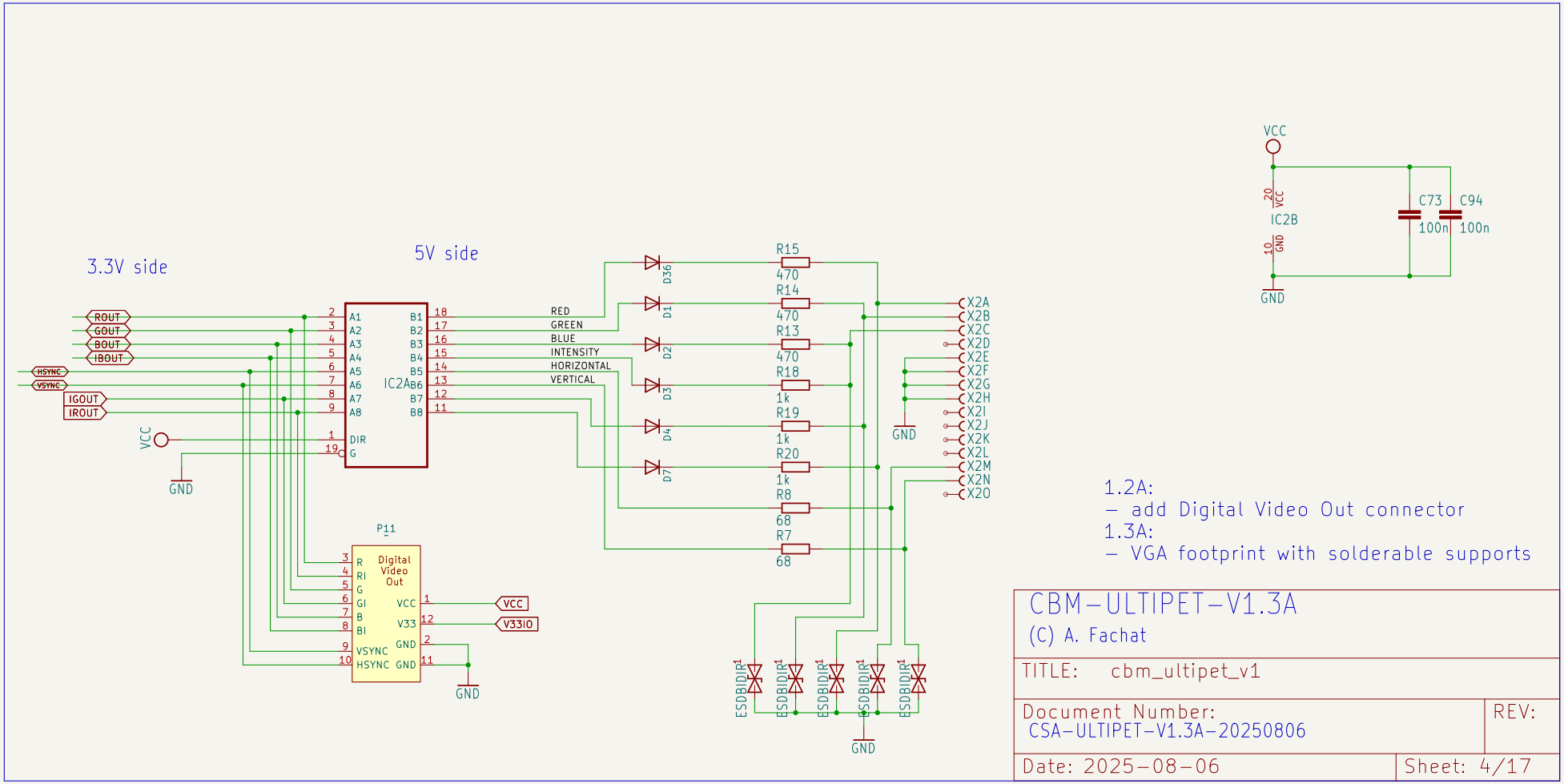
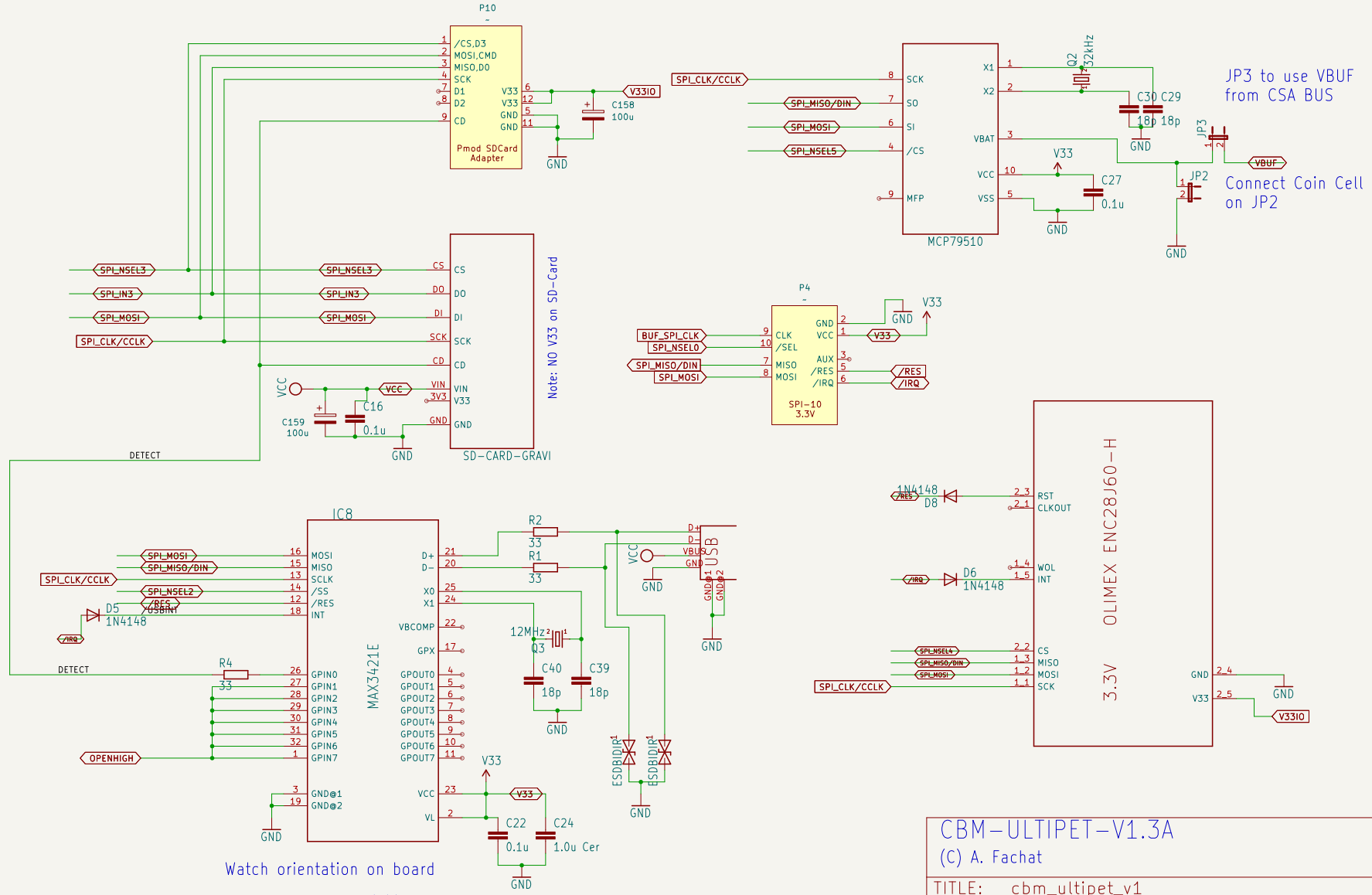


1.2A:
– add Digital Video Out connector
1.3A:
– VGA footprint with solderable supports

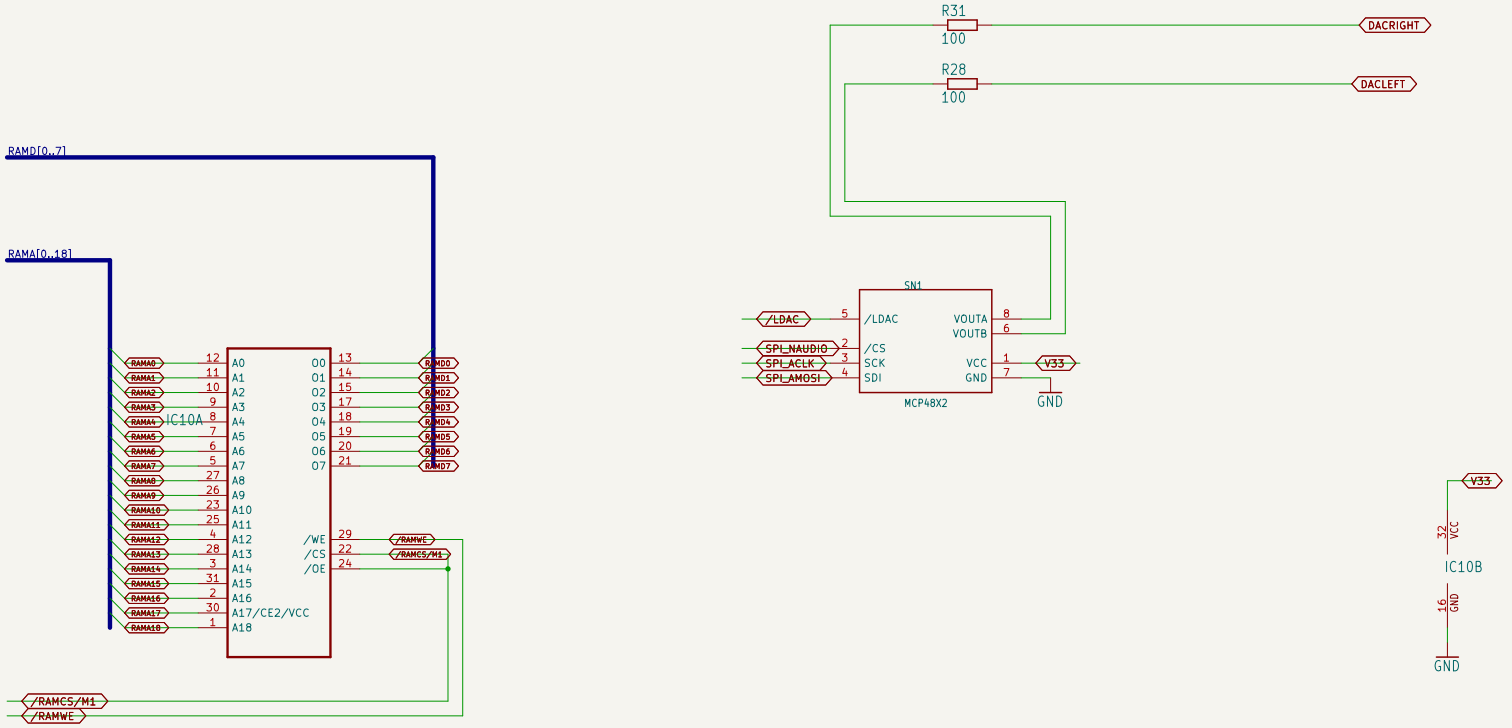
CBM–ULTIPET–V1.3A (C) A. Fachat	
TITLE: cbm_ultipet_v1	
Document Number: CSA–ULTIPET–V1.3A–20250806	REV:
Date: 2025–08–06	Sheet: 4/17



1.1A:
- Add second (option for) SD-Card adapter
- replace non-commercial use TQFP32 footprint with default kicad one

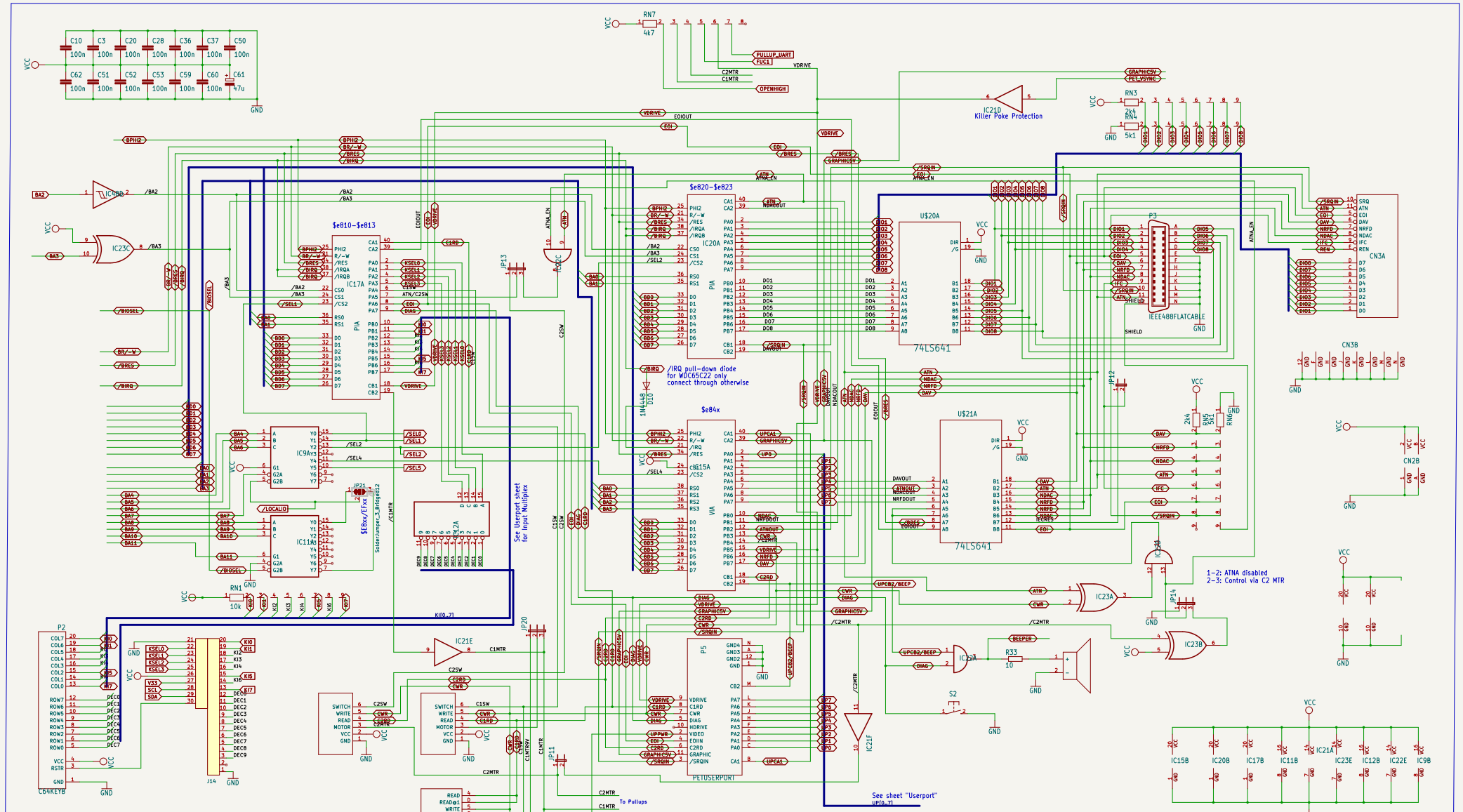
1.2A:
- use V33IO for Net and SD-Card
- added bypass caps for (large) SD-Card

CBM-ULTIPET-V1.3A (C) A. Fachat	
TITLE: cbm_ultipet_v1	
Document Number: CSA-ULTIPET-V1.1A-20241117	REV:
Date: 2025-08-06	Sheet: 5/17



1.2A:
– removed DAC output connector pins (already on SID page)

CBM-ULTIPET-V1.3A (C) A. Fachat	
TITLE: cbm_ultipet_v1	
Document Number: CBM-ULTIPET-V1.2A-20241010	REV:
Date: 2025-08-06	Sheet: 6/17


$e810–$e813
$e820–$e823
$e84x
/IRQ pull-down diode for WDC65C22 only connect through otherwise
1N4448
1N4148
See Userport sheet for Input Multiplex
See sheet "Userport" UP[0..7]
To Pullups
1–2: ATNA disabled
2–3: Control via C2 MTR
Killer Poke Protection
74LS641
IEEE488FLATCABLE
SHIELD
PETUSERPORT
C64KEYB
1.0B:
– fix IEEE488 pull up/down resistor values (again)
1.1A:
– fully decode PIA addresses
– replace some discrete Rs with RN7
– fix 2N2222 footprint for new BOM part
1.2A:
– fix addressing 2nd SID by moving BA7 to IC9
– replace JP8 with a solder jumper (I/O block address)
– replace 1N4148 with 1N4448 for lower fwd voltage drop
1.3A:
– replace std PET kbd connector with extended / IDC conn
CBM–ULTIPET–V1.3A
(C) A. Fachat
TITLE: cbm_ultipet_v1
Document Number: CBM–ULTIPET–V1.3A–20250806
REV:
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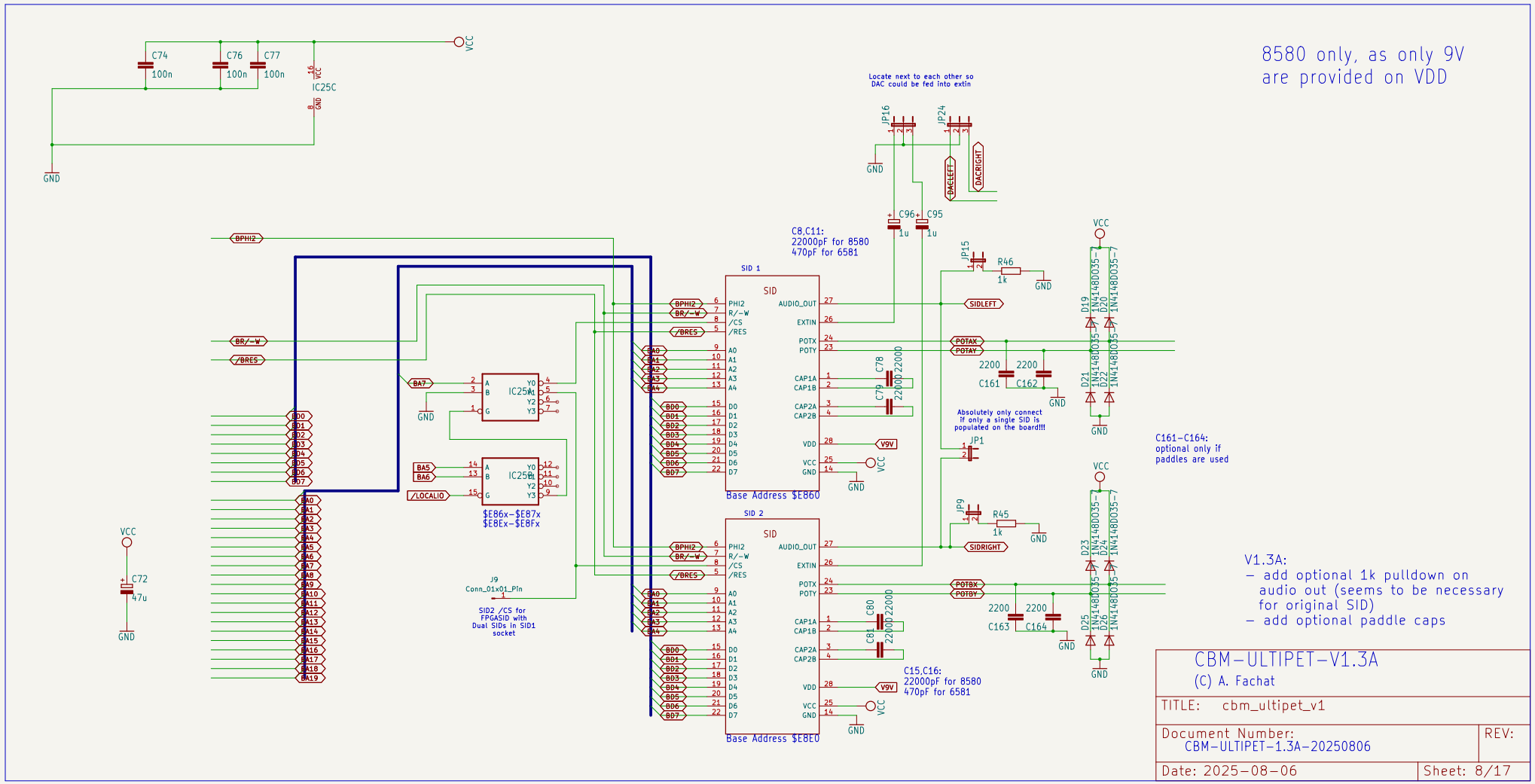
8580 only, as only 9V are provided on VDD
Locate next to each other so DAC could be fed into extin
C8,C11:
22000pF for 8580
470pF for 6581
C15,C16:
22000pF for 8580
470pF for 6581
Absolutely only connect if only a single SID is populated on the board!!!
C161-C164:
optional only if paddles are used
SID 1
Base Address $E860
SID 2
Base Address $E8E0
$E86x-$E87x
$E8Ex-$E8Fx
SID2 /CS for FPGASID with Dual SIDs in SID1 socket
V1.3A:
- add optional 1k pulldown on audio out (seems to be necessary for original SID)
- add optional paddle caps
CBM-ULTIPET-V1.3A
(C) A. Fachat
TITLE: cbm_ultipet_v1
Document Number: CBM-ULTIPET-1.3A-20250806
REV:
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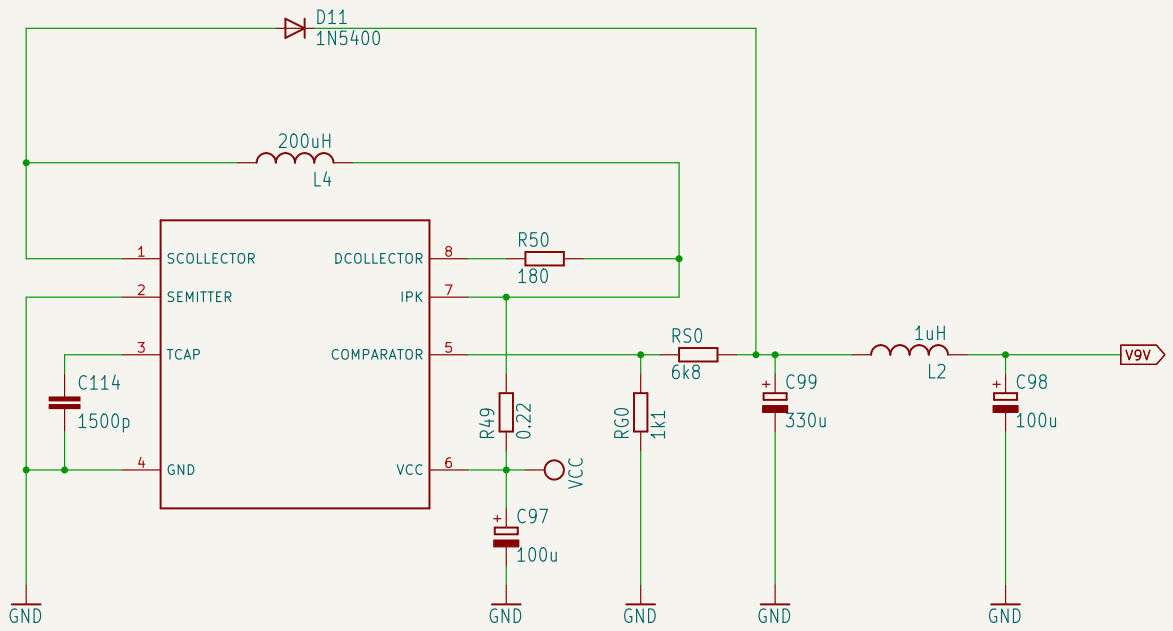


V1.0B:
- Fix parts footprint for L4, D2 and some caps

Vout=1.25 x (1 + RS/RG)

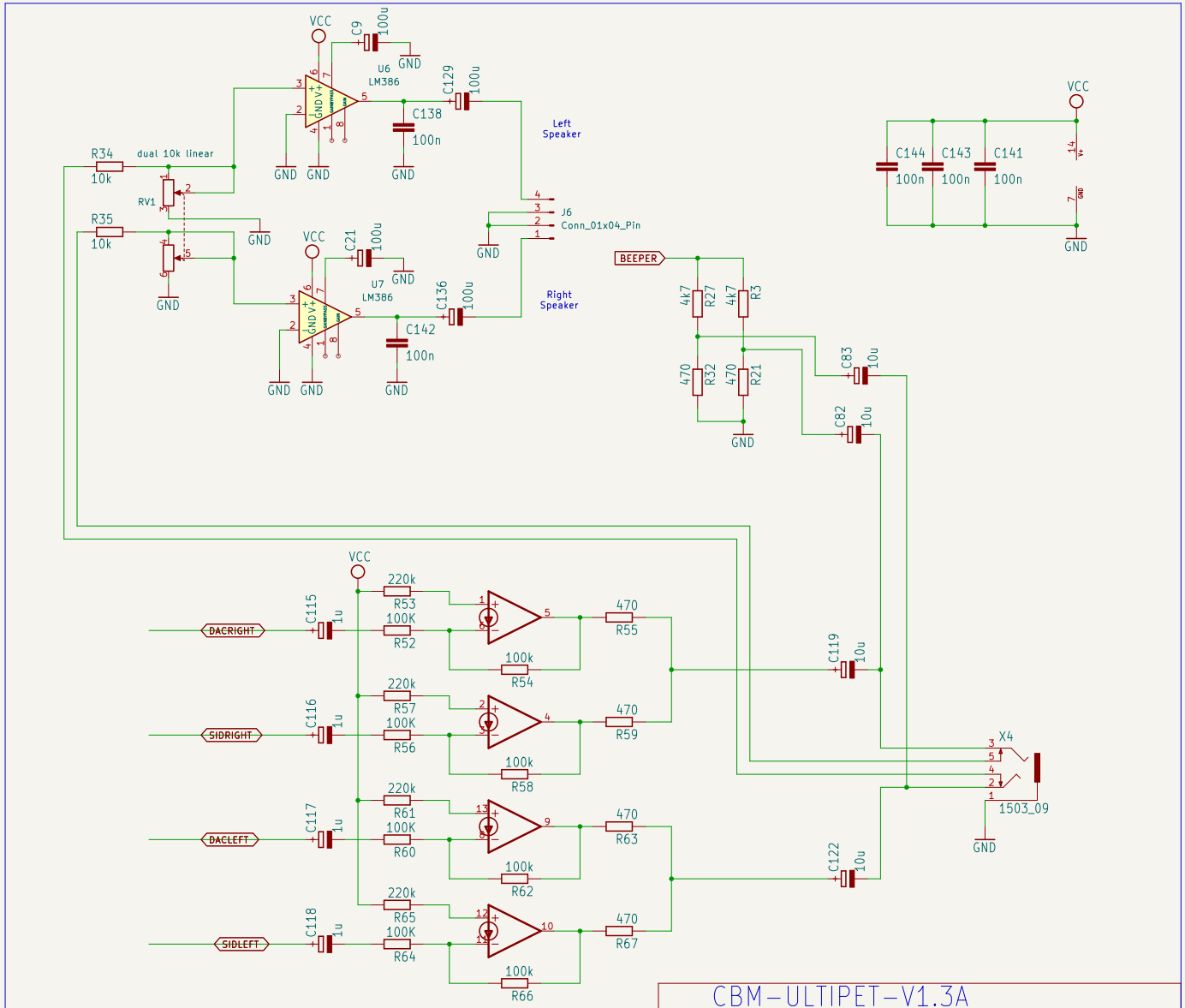
RS/RG = (Vout / 1.25) - 1

Vout = 9V -> RS/RG = 6.2
-> RG=1.1k, RS=6.8k

Vout = 12V -> ~~RS/RG = 8.6~~
-> ~~RG=1.2k~~, RS=10k

9V is not only used by SID
but also by Tape

CBM-ULTIPET-V1.3A (C) A. Fachat	
TITLE: cbm_ultipet_v1	
Document Number: CSA-DUALSID-1.0B-20231212	REV:
Date: 2025-08-06	Sheet: 9/17



1.0B: add voltage divider to reduce beeper volume on mixer output

1.2A:

- duplicate beeper voltage divider to reduce L/R crosstalk
- adjust beeper voltage divider resistor values
- add bypass / gain caps on audio amp

CBM-ULTIPET-V1.3A

(C) A. Fachat

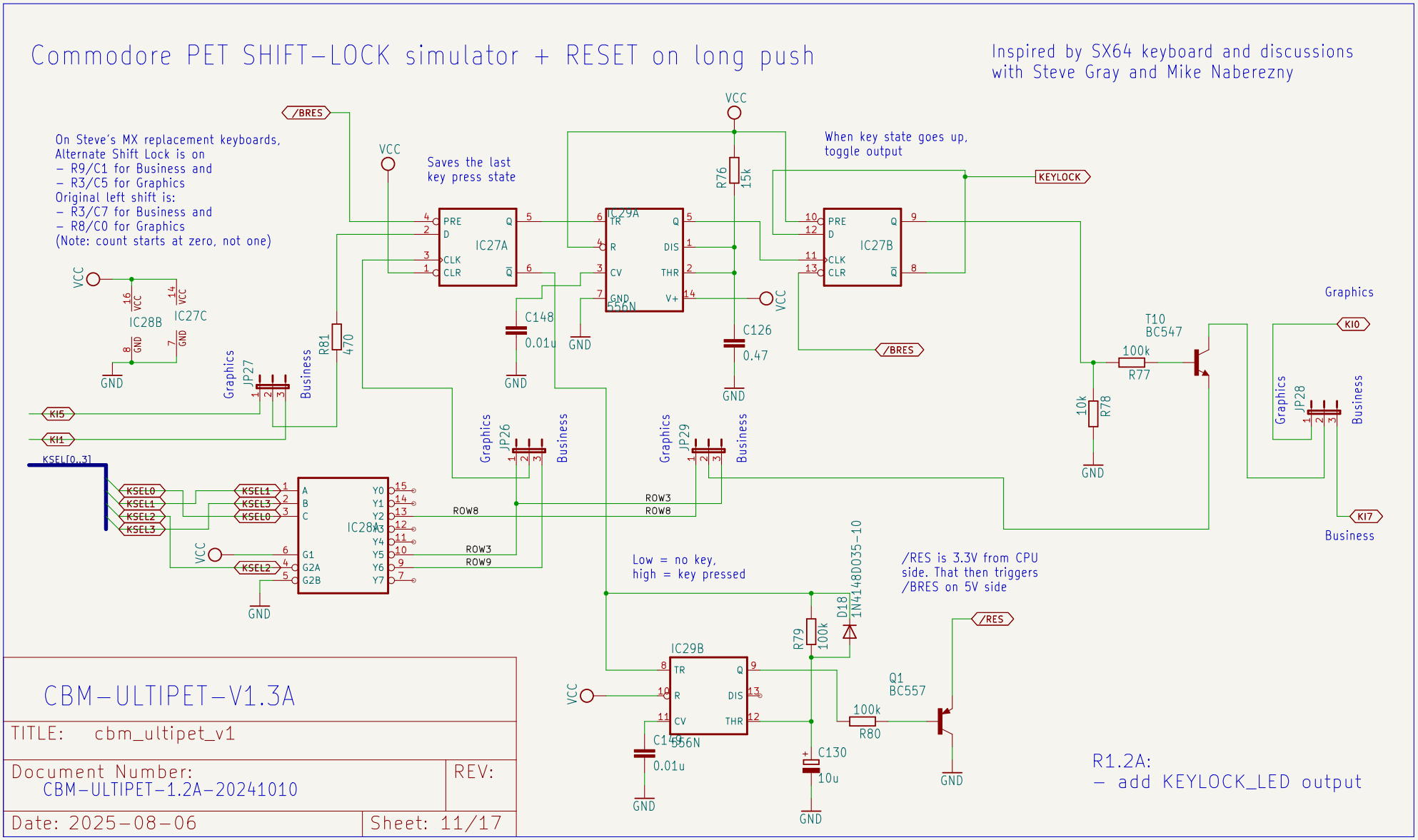
TITLE: cbm_ultipet_v1

Document Number: CBM-ULTIPET-1.2A-20241117

REV:

Date: 2025-08-06

Sheet: 10/17


Commodore PET SHIFT-LOCK simulator + RESET on long push
Inspired by SX64 keyboard and discussions with Steve Gray and Mike Naberezny
On Steve's MX replacement keyboards, Alternate Shift Lock is on
– R9/C1 for Business and
– R3/C5 for Graphics
Original left shift is:
– R3/C7 for Business and
– R8/C0 for Graphics
(Note: count starts at zero, not one)
Saves the last key press state
When key state goes up, toggle output
Low = no key, high = key pressed
/RES is 3.3V from CPU side. That then triggers /BRES on 5V side
R1.2A:
– add KEYLOCK_LED output
CBM-ULTIPET-V1.3A
TITLE: cbm_ultipet_v1
Document Number: CBM-ULTIPET-1.2A-20241010
REV:
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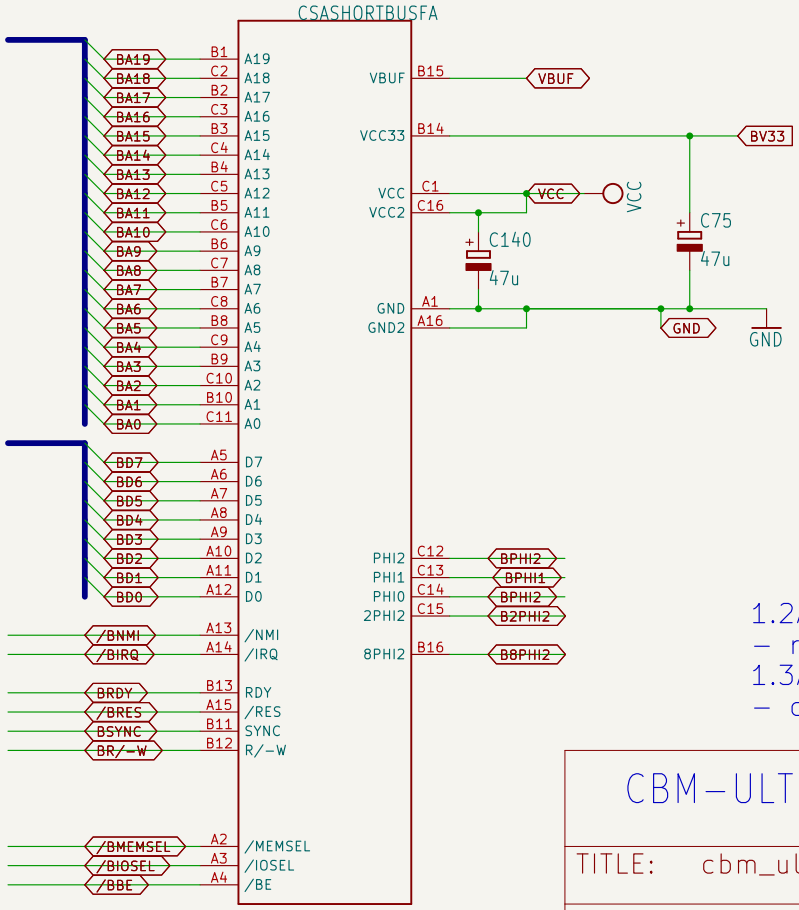

1.2A:
– replace V33 with V3310
1.3A:
– correct (mirrored) pinout

CBM-ULTIPET-V1.3A

TITLE: cbm_ultipet_v1	
Document Number: CBM-ULTIPET-V1.3A-20250806	REV:
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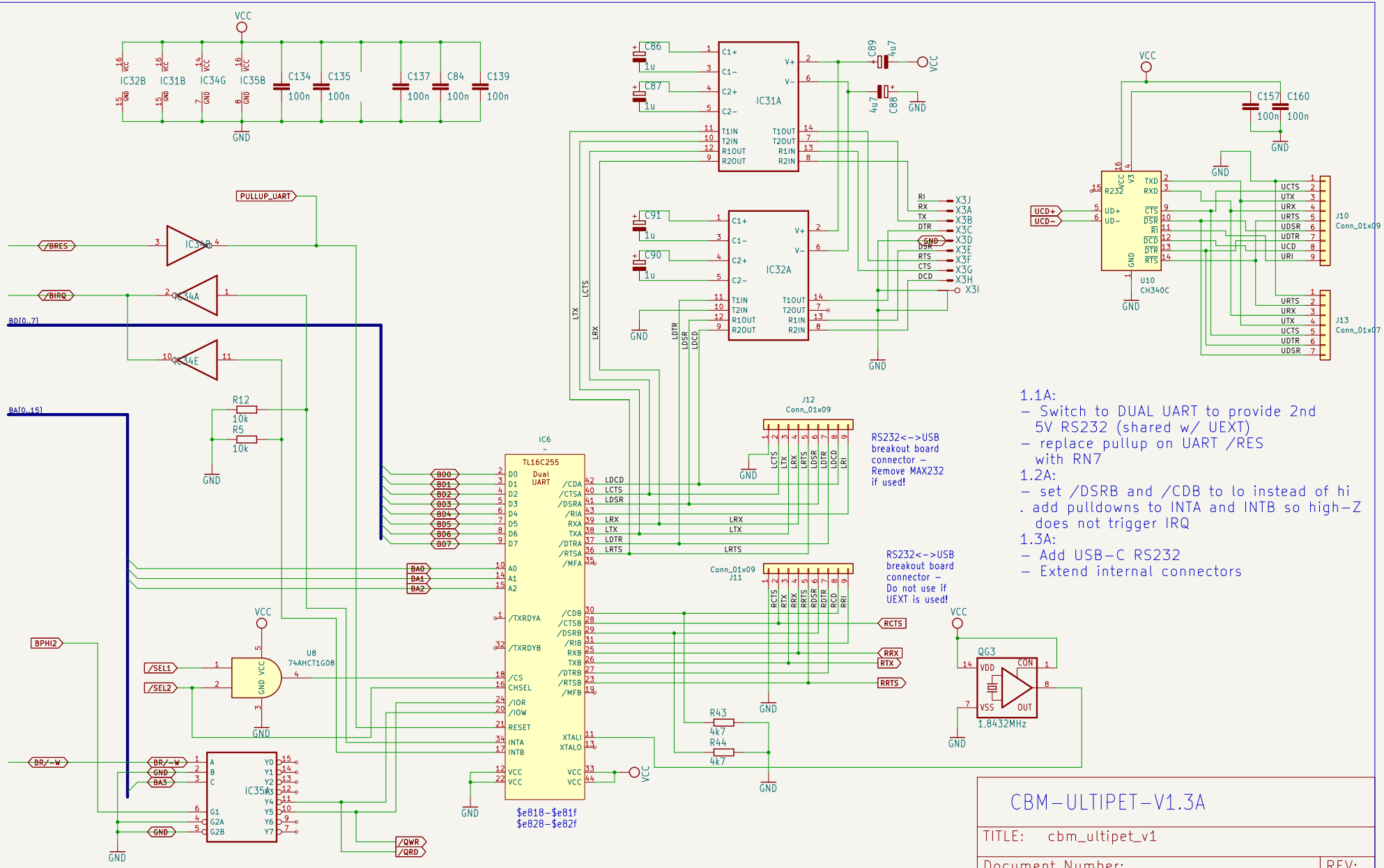
IC32B
IC31B
IC34G
IC35B
C134
C135
C137
C84
C139
100n
VCC
GND
C86
C87
1u
IC31A
C89
C88
4u7
C91
C90
IC32A
RI
RX
TX
DTR
DSR
RTS
CTS
DCD
X3J
X3A
X3B
X3C
X3D
X3E
X3F
X3G
X3H
X3I
C157
C160
U10
CH340C
UCD+
UCD-
J10
Conn_01x09
J13
Conn_01x07
PULLUP_UART
/BRES
/BIRQ
IC34B
IC34A
IC34E
BD[0..7]
BA[0..15]
R12
R5
10k
IC6
TL16C255
Dual UART
BD0
BD1
BD2
BD3
BD4
BD5
BD6
BD7
BA0
BA1
BA2
/CDA
/CTSA
/DSRA
/RIA
RXA
TXA
/DTRA
/RTSA
/MFA
/CDB
/CTSB
/DSRB
/RIB
RXB
TXB
/DTRB
/RTSB
/MFB
/TXRDYA
/TXRDYB
/CS
CHSEL
/IOR
/IOW
RESET
INTA
INTB
XTALI
XTALO
LDCD
LCTS
LDSR
LRX
LTX
LDTR
LRTS
J12
Conn_01x09
RS232<->USB breakout board connector – Remove MAX232 if used!
J11
RS232<->USB breakout board connector – Do not use if UEXT is used!
RCTS
RRX
RTX
RRTS
R43
R44
4k7
QG3
1,8432MHz
BPHI2
/SEL1
/SEL2
U8
74AHCT1G08
BR/-W
IC35
/QWR
/QRD
$e818–$e81f
$e828–$e82f
1.1A:
– Switch to DUAL UART to provide 2nd 5V RS232 (shared w/ UEXT)
– replace pullup on UART /RES with RN7
1.2A:
– set /DSRB and /CDB to lo instead of hi
. add pulldowns to INTA and INTB so high–Z does not trigger IRQ
1.3A:
– Add USB–C RS232
– Extend internal connectors
CBM–ULTIPET–V1.3A
TITLE: cbm_ultipet_v1
Document Number: CBM–ULTIPET–V1.3A–20250806
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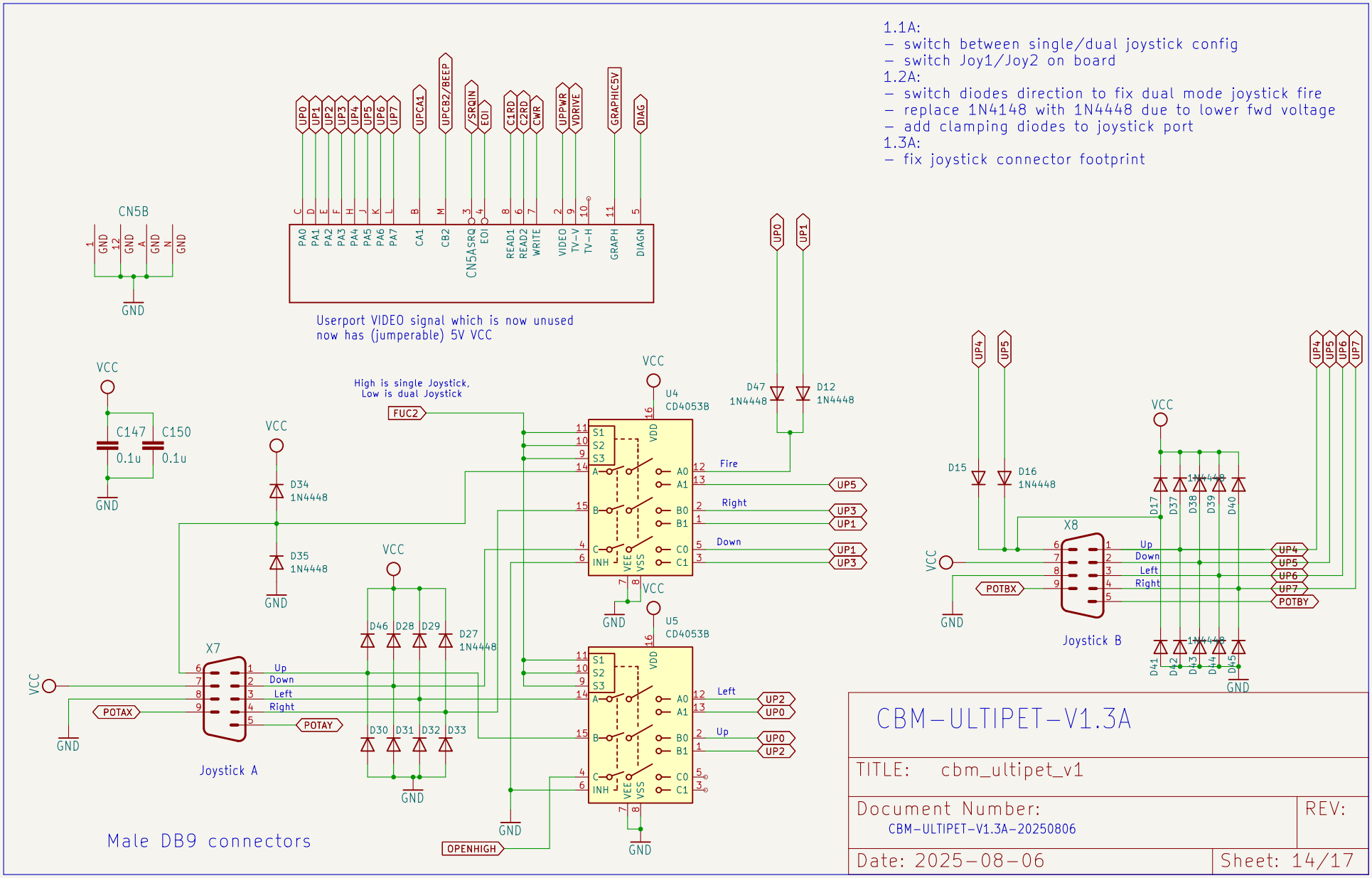
1.1A:
– switch between single/dual joystick config
– switch Joy1/Joy2 on board
1.2A:
– switch diodes direction to fix dual mode joystick fire
– replace 1N4148 with 1N4448 due to lower fwd voltage
– add clamping diodes to joystick port
1.3A:
– fix joystick connector footprint
CN5B
GND
UP0 UP1 UP2 UP3 UP4 UP5 UP6 UP7
UPCA1
UPCB2/BEEP
/SRQIN
EOI
C1RD C2RD CWR
UPPWR VDRIVE
GRAPHIC5V
DIAG
PA0 PA1 PA2 PA3 PA4 PA5 PA6 PA7
CA1
CB2
CN5ASRQ
EOI
READ1 READ2 WRITE
VIDEO TV-V TV-H
GRAPH
DIAGN
Userport VIDEO signal which is now unused
now has (jumperable) 5V VCC
VCC
C147 0.1u
C150 0.1u
High is single Joystick,
Low is dual Joystick
FUC2
U4 CD4053B
U5 CD4053B
S1 S2 S3 A B C INH VDD VEE VSS A0 A1 B0 B1 C0 C1
Fire
Right
Down
Left
Up
UP5
UP3
UP1
UP2
UP0
D34 1N4448
D35 1N4448
D46 D28 D29 D27 1N4448
D30 D31 D32 D33
D47 1N4448
D12 1N4448
X7
Up
Down
Left
Right
POTAX
POTAY
Joystick A
OPENHIGH
Male DB9 connectors
D15 D16 1N4448
X8
POTBX
POTBY
Joystick B
D17 D37 D38 D39 D40
D41 D42 D43 D44 D45
CBM–ULTIPET–V1.3A
TITLE: cbm_ultipet_v1
Document Number:
CBM–ULTIPET–V1.3A–20250806
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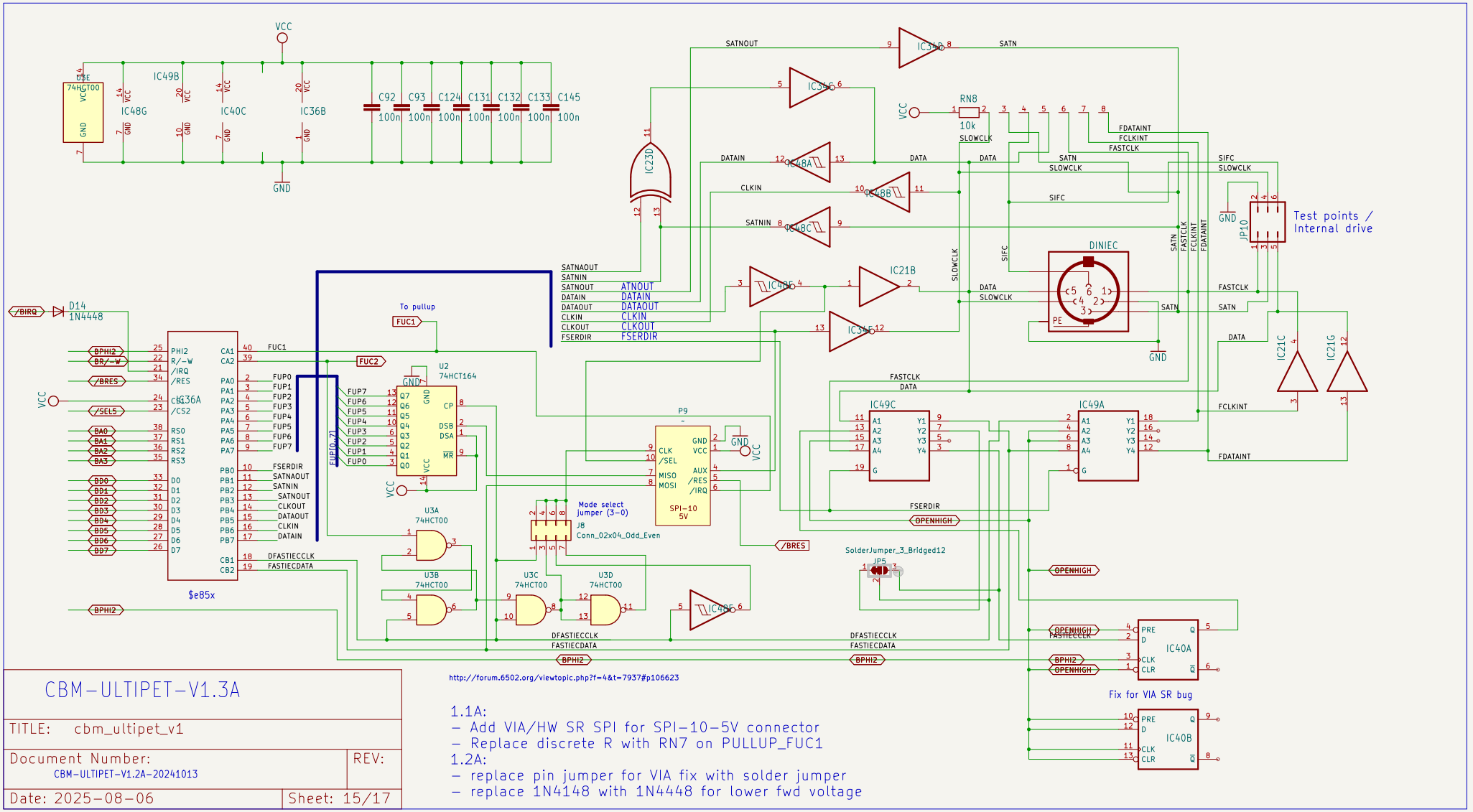
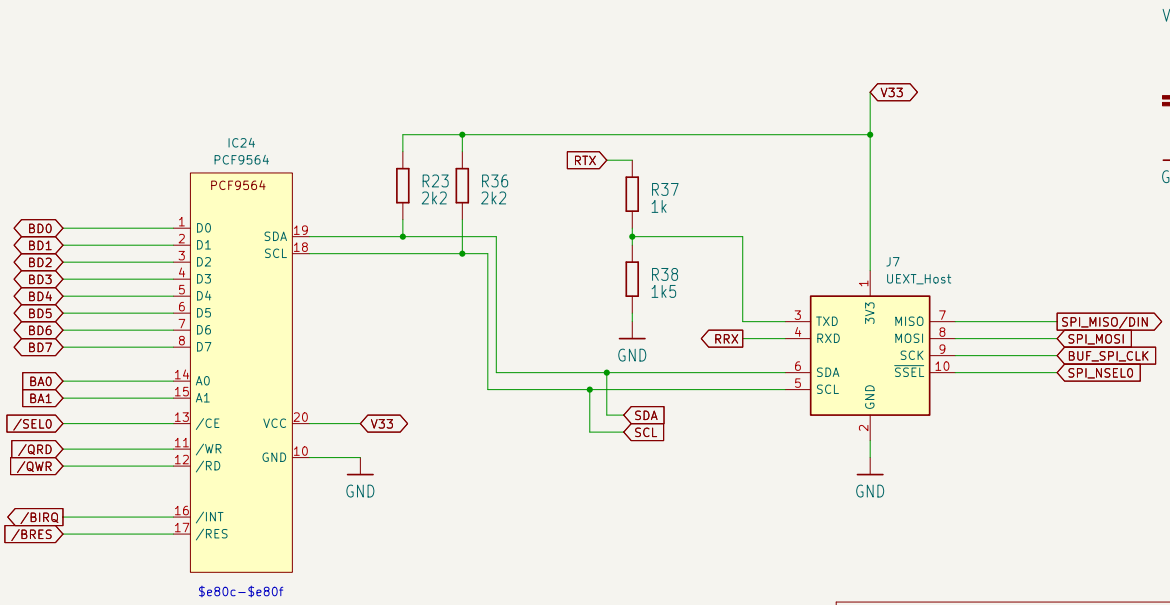

VCC
GND
IC49B
IC48G
IC40C
IC36B
C92 100n
C93 100n
C124 100n
C131 100n
C132 100n
C133 100n
C145 100n
SATNOUT
SATN
DATAIN
DATA
CLKIN
SATNIN
SATNAOUT
SATNIN
SATNOUT
DATAIN
DATAOUT
CLKIN
CLKOUT
FSERDIR
ATNOUT
DATAIN
DATAOUT
CLKIN
CLKOUT
FSERDIR
RN8
10k
SLOWCLK
FDATAINT
FCLKINT
FASTCLK
SIFC
DINIEC
PE
JP10
Test points / Internal drive
IC21B
IC21C
IC21G
/BIRQ
D14
1N4448
To pullup
FUC1
FUC2
$e85x
PHI2
R/-W
/IRQ
/RES
/CS1
/CS2
RS0
RS1
RS2
RS3
D0
D1
D2
D3
D4
D5
D6
D7
CA1
CA2
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
CB1
CB2
FUP0
FUP1
FUP2
FUP3
FUP4
FUP5
FUP6
FUP7
FSERDIR
SATNAOUT
SATNIN
SATNOUT
CLKOUT
DATAOUT
CLKIN
DATAIN
DFASTIECCLK
FASTIECDATA
BPHI2
BR/-W
/BRES
/SEL5
BA0
BA1
BA2
BA3
BD0
BD1
BD2
BD3
BD4
BD5
BD6
BD7
U2
74HCT164
FUP[0..7]
U3A
U3B
U3C
U3D
74HCT00
Mode select jumper (3-0)
J8
Conn_02x04_Odd_Even
P9
SPI-10 5V
/BRES
SolderJumper_3_Bridged12
JP5
IC49C
IC49A
IC40A
IC40B
OPENHIGH
Fix for VIA SR bug
http://forum.6502.org/viewtopic.php?f=4&t=7937#p106623
CBM-ULTIPET-V1.3A
TITLE: cbm_ultipet_v1
Document Number:
CBM-ULTIPET-V1.2A-20241013
REV:
Date: 2025-08-06
Sheet: 15/17
1.1A:
- Add VIA/HW SR SPI for SPI-10-5V connector
- Replace discrete R with RN7 on PULLUP_FUC1
1.2A:
- replace pin jumper for VIA fix with solder jumper
- replace 1N4148 with 1N4448 for lower fwd voltage



1.1A:
– this page is new
1.3A:
– extra labels for SDA/SCL

CBM–ULTIPET–V1.3A	
TITLE: cbm_ultipet_v1	
Document Number: CBM–ULTIPET–1.1A–20250806	REV:
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