Quad AMBE-3000R Board

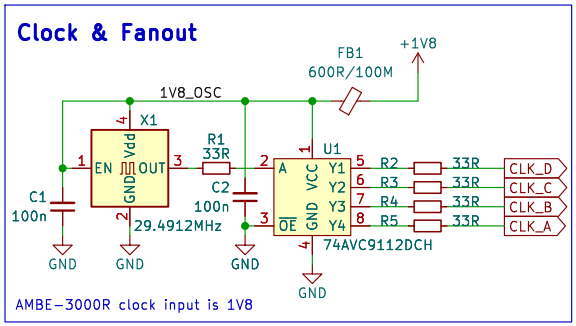
For digital voice decoding & transcoding systems, WebSDR receivers, etc.

George Smart, M1GEO. Chris Smart, G8OCV.
https://github.com/m1geo/Quad-AMBE3000

Power Supplies & Sequencing

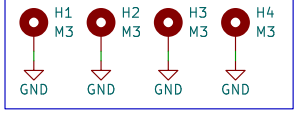
File: psu.kicad_sch

Clock & Fanout

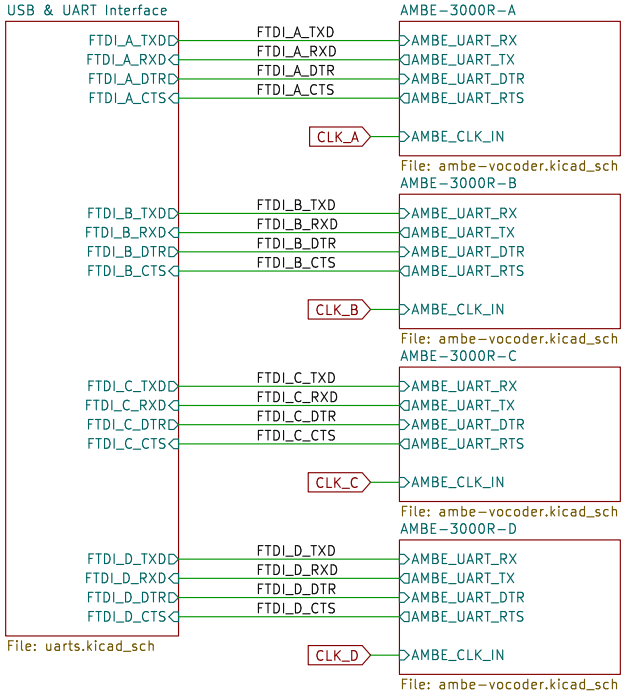


AMBE-3000R clock input is 1V8

Mounting Holes



USB & UART Interface



https://www.george-smart.co.uk
https://github.com/m1geo/Quad-AMBE3000
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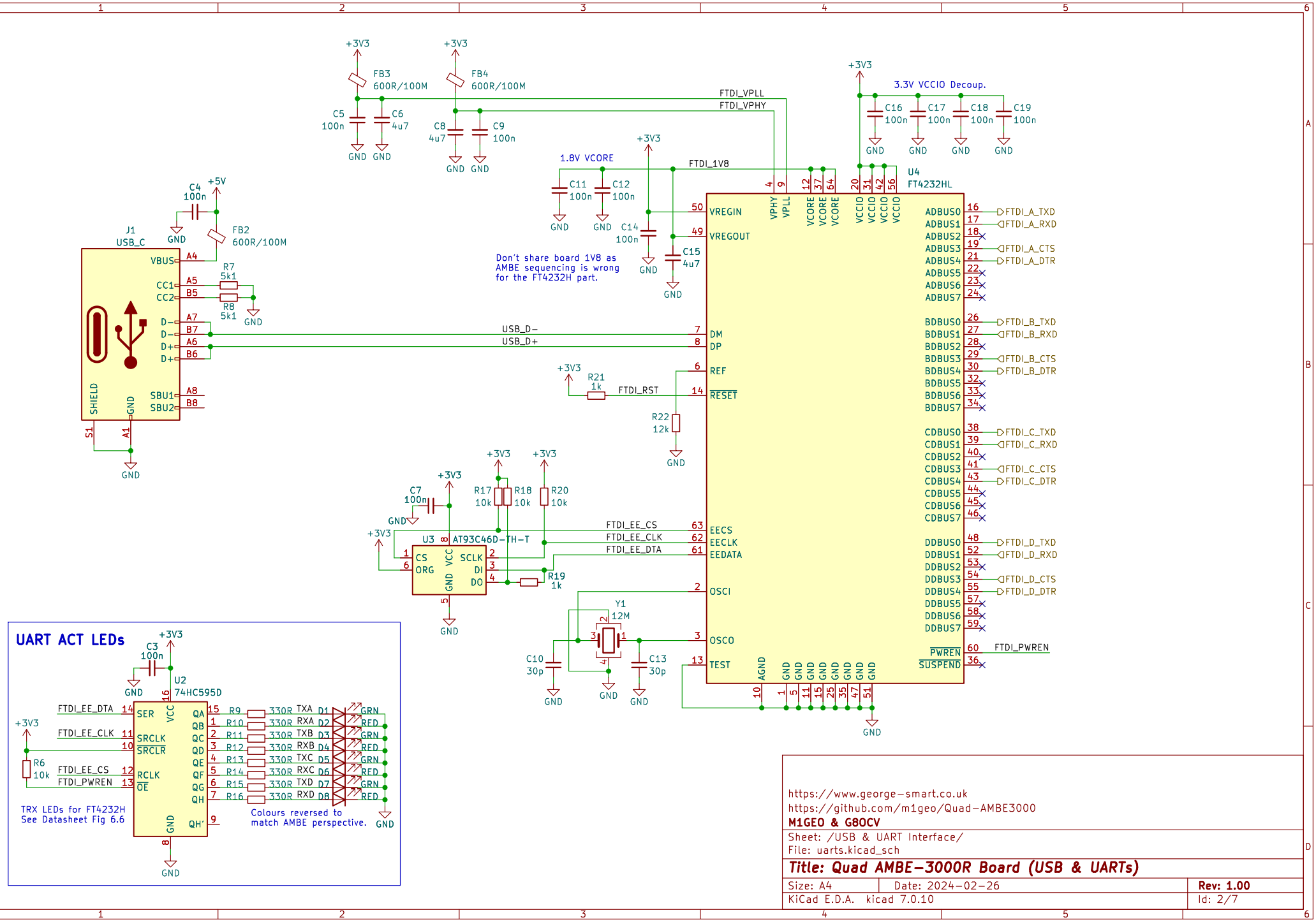
Sheet: /
File: Quad-AMBE3000.kicad_sch

Title: Quad AMBE-3000R Board (Top)

Size: A4	Date: 2024-02-26	**Rev: 1.00**
KiCad E.D.A. kicad 7.0.10		Id: 1/7


+3V3
FB3
600R/100M
FB4
600R/100M
C5
100n
C6
4u7
C8
4u7
C9
100n
GND
FTDI_VPLL
FTDI_VPHY
3.3V VCCIO Decoup.
C16
100n
C17
100n
C18
100n
C19
100n
1.8V VCORE
FTDI_1V8
C11
100n
C12
100n
C14
100n
C15
4u7
U4
FT4232HL
VREGIN
VREGOUT
VPHY
VPLL
VCORE
VCCIO
ADBUS0
ADBUS1
ADBUS2
ADBUS3
ADBUS4
ADBUS5
ADBUS6
ADBUS7
FTDI_A_TXD
FTDI_A_RXD
FTDI_A_CTS
FTDI_A_DTR
BDBUS0
BDBUS1
BDBUS2
BDBUS3
BDBUS4
BDBUS5
BDBUS6
BDBUS7
FTDI_B_TXD
FTDI_B_RXD
FTDI_B_CTS
FTDI_B_DTR
CDBUS0
CDBUS1
CDBUS2
CDBUS3
CDBUS4
CDBUS5
CDBUS6
CDBUS7
FTDI_C_TXD
FTDI_C_RXD
FTDI_C_CTS
FTDI_C_DTR
DDBUS0
DDBUS1
DDBUS2
DDBUS3
DDBUS4
DDBUS5
DDBUS6
DDBUS7
FTDI_D_TXD
FTDI_D_RXD
FTDI_D_CTS
FTDI_D_DTR
PWREN
SUSPEND
FTDI_PWREN
DM
DP
REF
RESET
EECS
EECLK
EEDATA
OSCI
OSCO
TEST
AGND
Don't share board 1V8 as
AMBE sequencing is wrong
for the FT4232H part.
J1
USB_C
VBUS
CC1
CC2
D-
D+
SHIELD
SBU1
SBU2
C4
100n
+5V
FB2
600R/100M
R7
5k1
R8
5k1
USB_D-
USB_D+
R21
1k
FTDI_RST
R22
12k
C7
100n
U3
AT93C46D-TH-T
CS
SCLK
DI
DO
ORG
VCC
GND
R17
10k
R18
10k
R20
10k
R19
1k
FTDI_EE_CS
FTDI_EE_CLK
FTDI_EE_DTA
Y1
12M
C10
30p
C13
30p
UART ACT LEDs
C3
100n
U2
74HC595D
SER
SRCLK
SRCLR
RCLK
OE
QA
QB
QC
QD
QE
QF
QG
QH
QH'
R6
10k
R9
R10
R11
R12
R13
R14
R15
R16
330R
TXA
RXA
TXB
RXB
TXC
RXC
TXD
RXD
D1
D2
D3
D4
D5
D6
D7
D8
GRN
RED
TRX LEDs for FT4232H
See Datasheet Fig 6.6
Colours reversed to
match AMBE perspective.
https://www.george-smart.co.uk
https://github.com/m1geo/Quad-AMBE3000
M1GEO & G8OCV
Sheet: /USB & UART Interface/
File: uarts.kicad_sch
Title: Quad AMBE-3000R Board (USB & UARTs)
Size: A4
Date: 2024-02-26
Rev: 1.00
KiCad E.D.A. kicad 7.0.10
Id: 2/7

AMBE-3000R: 3.5 Power Sequencing Requirements
Enable power to all 3.3V supply pins and then ramp 1.8V supply pins.
1.8V hould not reach 0.3V until VDDIO has reached 2.5V.
This ensures the reset signal from the I/O pin has propagated through the
I/O buffer to provide power-on reset to all the modules inside the device.

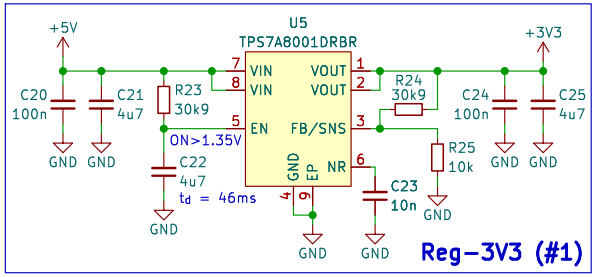
AMBE-3000R Maximum Current Values
1.8V: 193 mW => 108mA (432mA for 4)
3.3V: 171 mW => 52mA (208mA for 4)

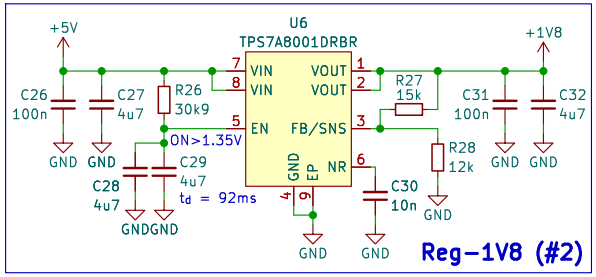
FTDI FT4232HL Maximum Current Values
1.8V: => 70mA
3.3V: => 60+10mA

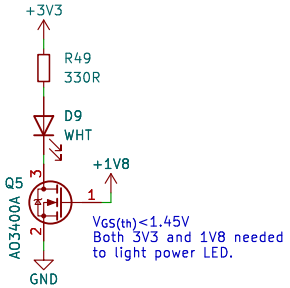
LDO Power Diss (5.1V direct)
((5.1V-1.8V)*432mA) => 1426mW
((5.1V-3.3V)*208mA) => 375mW

LDO Power Diss (5.1V -> 3.3V -> 1.8V)
((5.1V-3.3V)*(208mA+432mA)) => 1152mW
((3.3V-1.8V)*432mA) => 648mW

Total Copper Area for Both: ~ 50mm²







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Sheet: /Power Supplies & Sequencing/
File: psu.kicad_sch

Title: Quad AMBE-3000R Board (Power Supplies & Sequencing)

Size: A4	Date: 2024-02-26	**Rev: 1.00**
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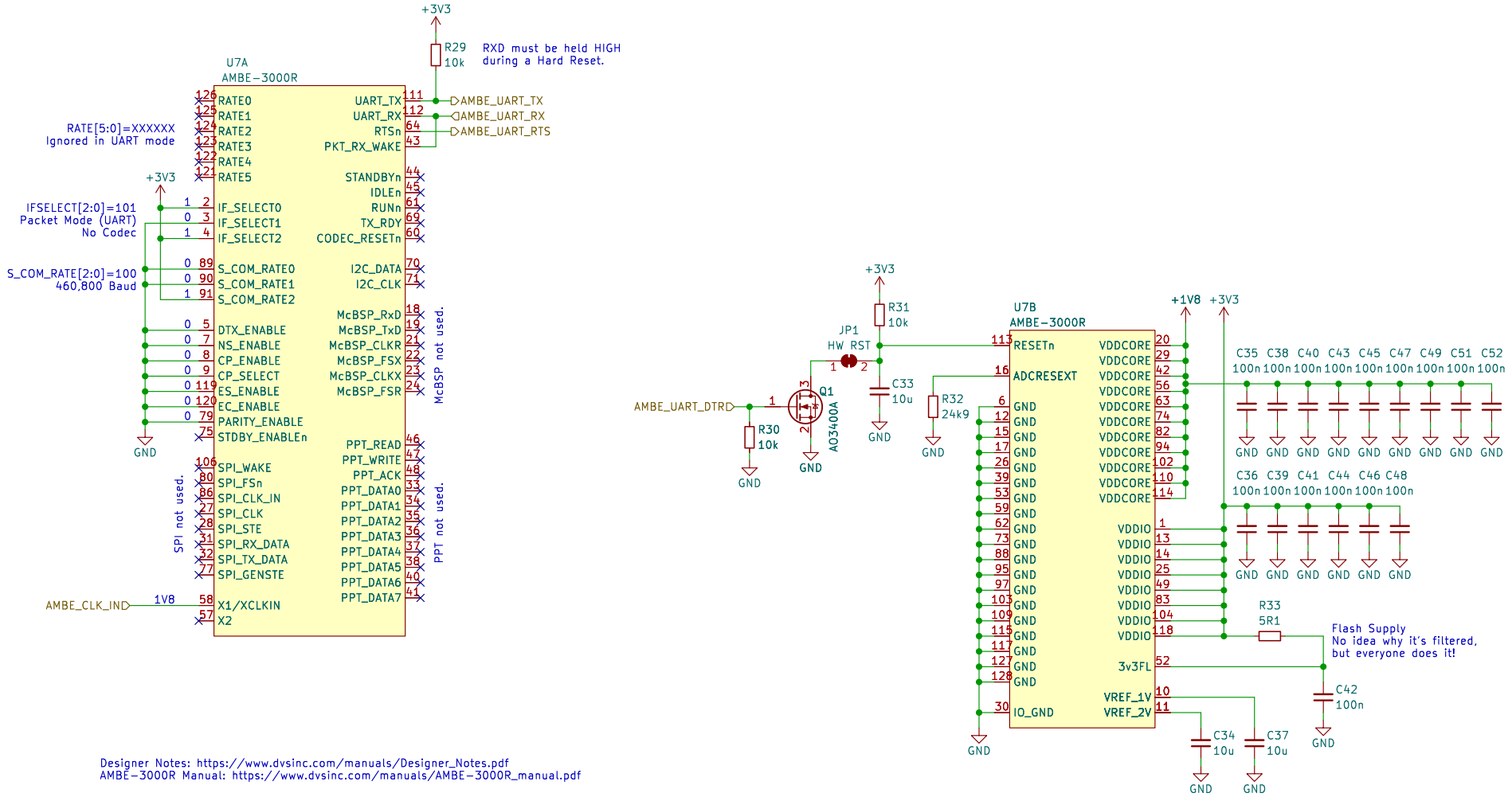


Designer Notes: https://www.dvsinc.com/manuals/Designer_Notes.pdf
AMBE-3000R Manual: https://www.dvsinc.com/manuals/AMBE-3000R_manual.pdf

When designing a system using the UART interface on the AMBE-3000 Vocoder Chip it is necessary that the UART_TX pin (pin 111 QFP – pin C7 BGA) be held high at boot. This will ensure the AMBE-3000 Vocoder Chip will start in the proper configuration

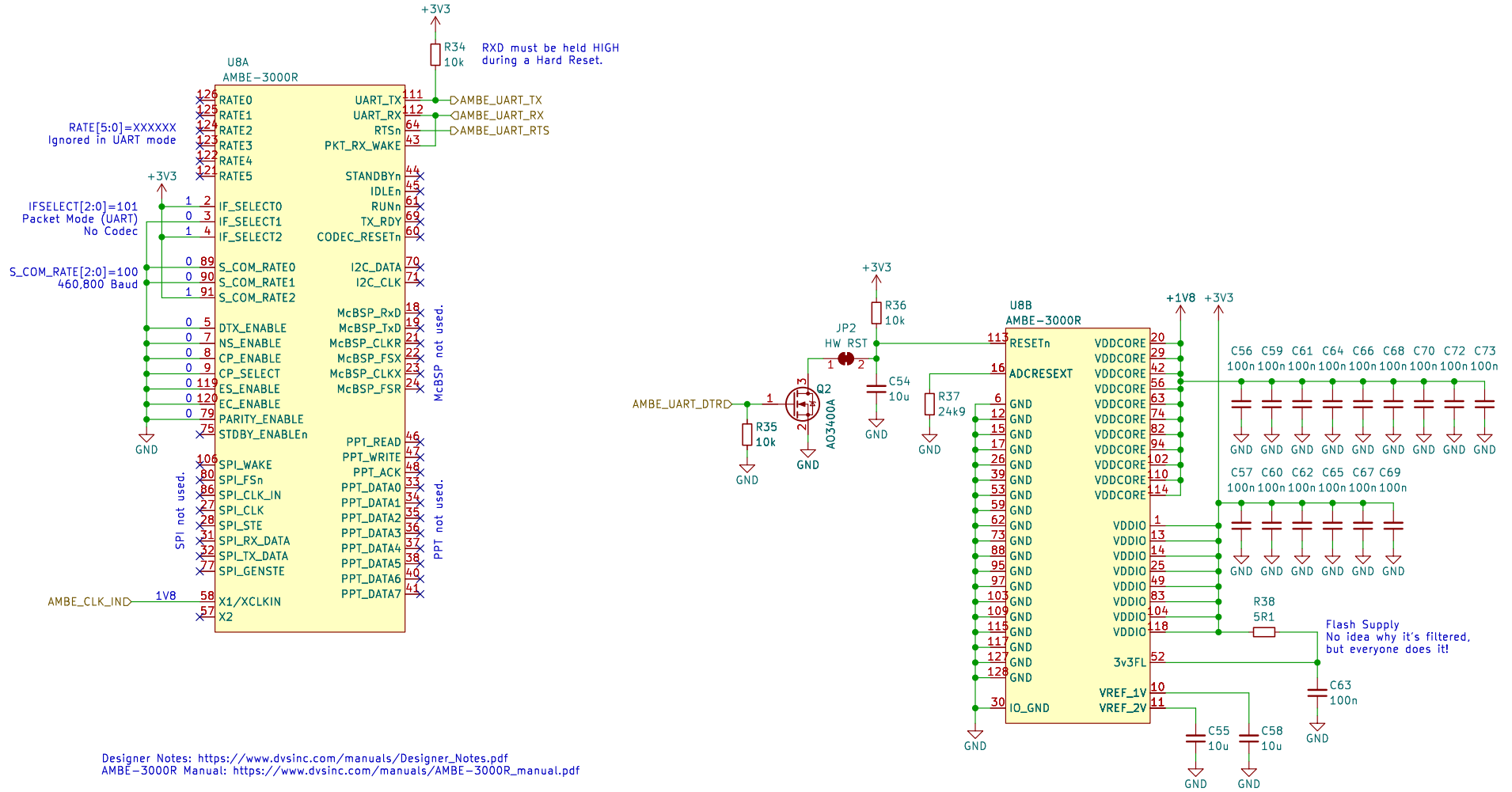
Packet mode – see section 5.1.3 in the manual

https://www.george-smart.co.uk
https://github.com/m1geo/Quad-AMBE3000
M1GEO & G8OCV

Sheet: /AMBE-3000R-A/
File: ambe-vocoder.kicad_sch

Title: Quad AMBE-3000R Board (AMBE-3000R Vocoder)

Size: A4	Date: 2024-02-26	**Rev: 1.00**
KiCad E.D.A. kicad 7.0.10		Id: 4/7



Designer Notes: https://www.dvsinc.com/manuals/Designer_Notes.pdf
AMBE-3000R Manual: https://www.dvsinc.com/manuals/AMBE-3000R_manual.pdf

When designing a system using the UART interface on the AMBE-3000 Vocoder Chip it is necessary that the UART_TX pin (pin 111 QFP – pin C7 BGA) be held high at boot. This will ensure the AMBE-3000 Vocoder Chip will start in the proper configuration

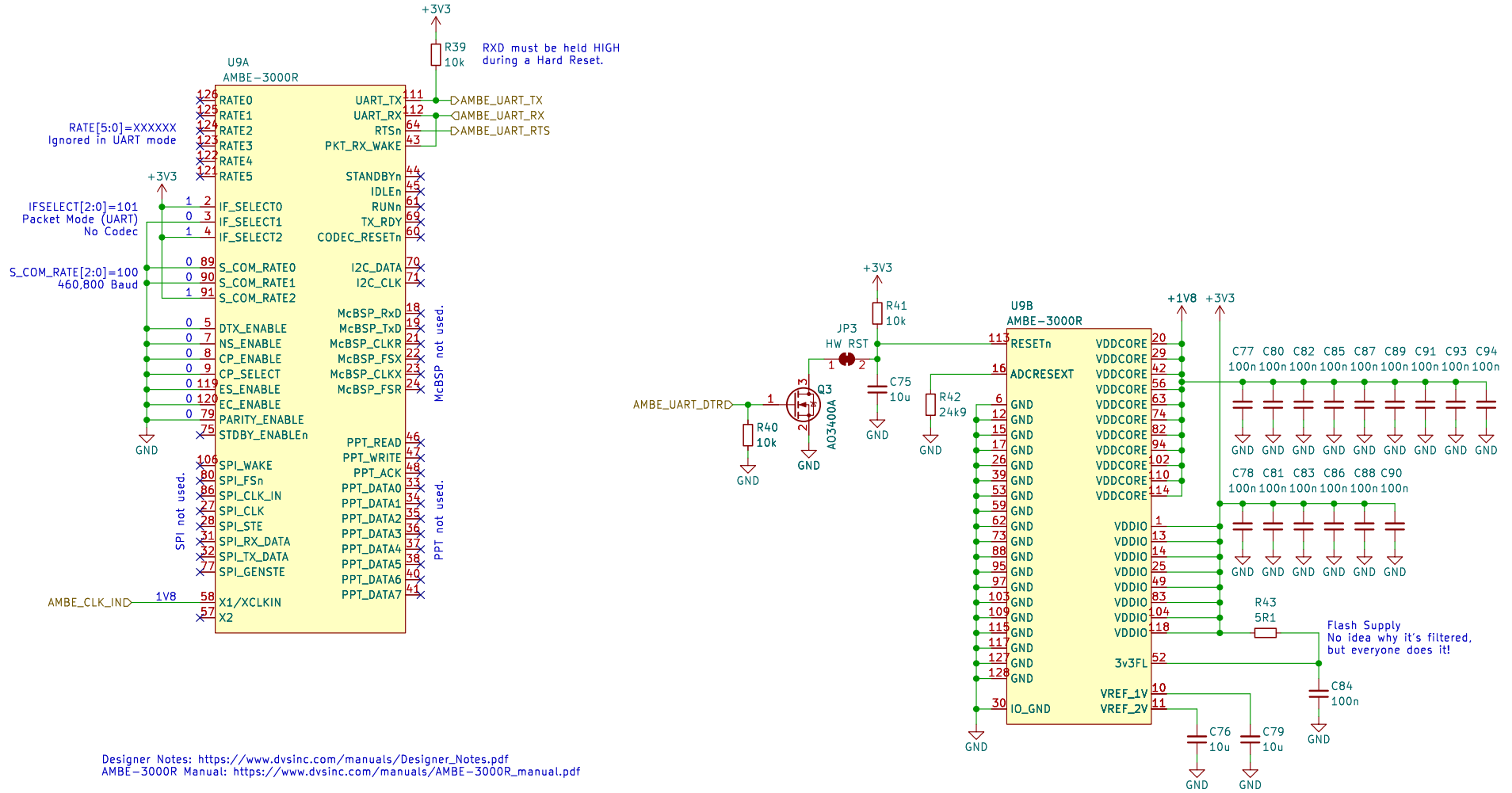
Packet mode – see section 5.1.3 in the manual

https://www.george-smart.co.uk
https://github.com/m1geo/Quad-AMBE3000
M1GEO & G8OCV

Sheet: /AMBE-3000R-B/
File: ambe-vocoder.kicad_sch

Title: Quad AMBE-3000R Board (AMBE-3000R Vocoder)

Size: A4	Date: 2024-02-26	**Rev: 1.00**
KiCad E.D.A. kicad 7.0.10		Id: 5/7



Designer Notes: https://www.dvsinc.com/manuals/Designer_Notes.pdf
AMBE-3000R Manual: https://www.dvsinc.com/manuals/AMBE-3000R_manual.pdf

When designing a system using the UART interface on the AMBE-3000 Vocoder Chip it is necessary that the UART_TX pin (pin 111 QFP – pin C7 BGA) be held high at boot. This will ensure the AMBE-3000 Vocoder Chip will start in the proper configuration

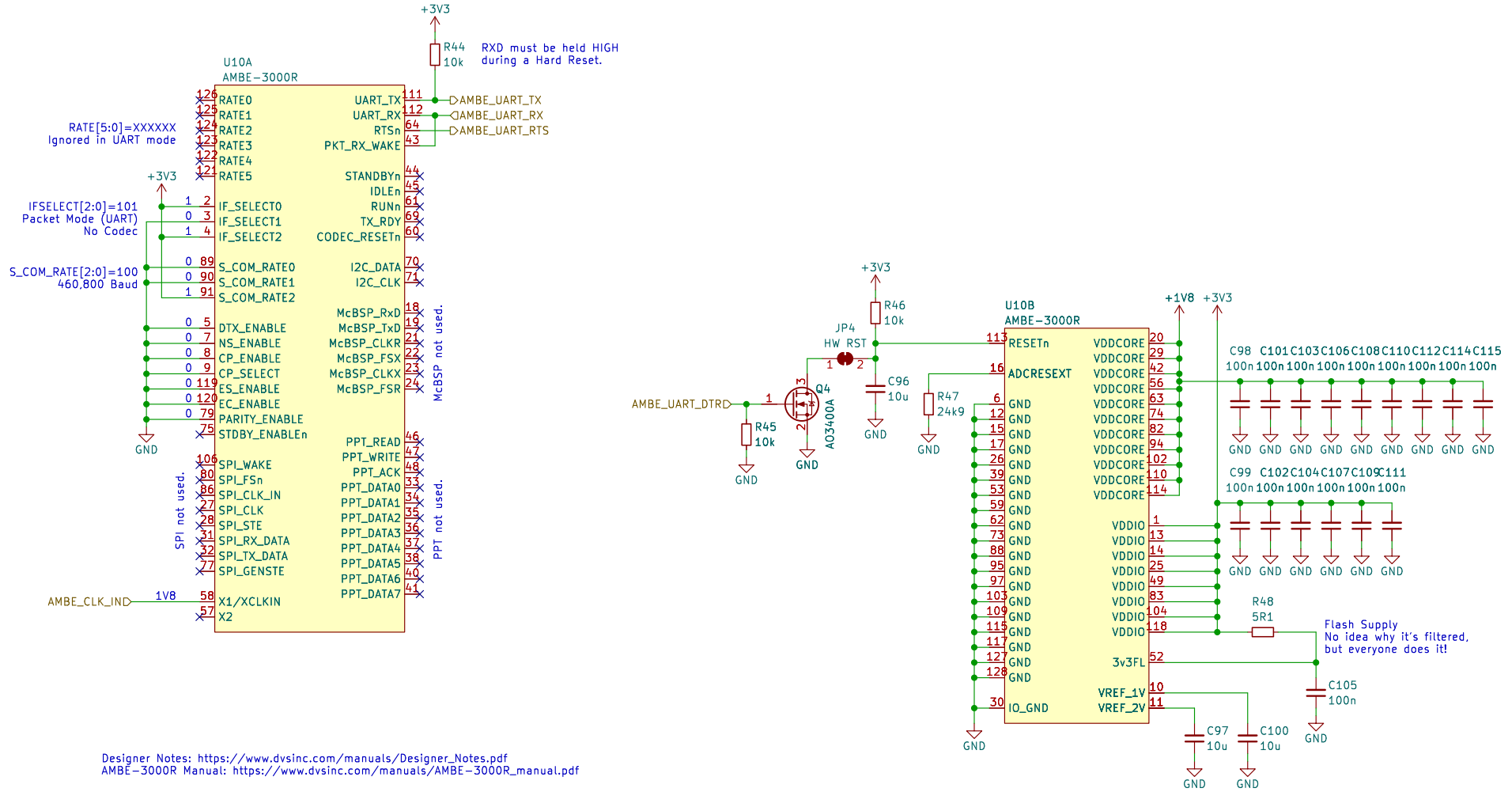
Packet mode – see section 5.1.3 in the manual

https://www.george-smart.co.uk
https://github.com/m1geo/Quad-AMBE3000
M1GEO & G8OCV

Sheet: /AMBE-3000R-C/
File: ambe-vocoder.kicad_sch

Title: Quad AMBE-3000R Board (AMBE-3000R Vocoder)

Size: A4	Date: 2024-02-26	**Rev: 1.00**
KiCad E.D.A. kicad 7.0.10		Id: 6/7



Designer Notes: https://www.dvsinc.com/manuals/Designer_Notes.pdf
AMBE-3000R Manual: https://www.dvsinc.com/manuals/AMBE-3000R_manual.pdf

When designing a system using the UART interface on the AMBE-3000 Vocoder Chip it is necessary that the UART_TX pin (pin 111 QFP – pin C7 BGA) be held high at boot. This will ensure the AMBE-3000 Vocoder Chip will start in the proper configuration

Packet mode – see section 5.1.3 in the manual

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M1GEO & G8OCV

Sheet: /AMBE-3000R-D/
File: ambe-vocoder.kicad_sch

Title: Quad AMBE-3000R Board (AMBE-3000R Vocoder)

Size: A4	Date: 2024-02-26	**Rev: 1.00**
KiCad E.D.A. kicad 7.0.10		Id: 7/7