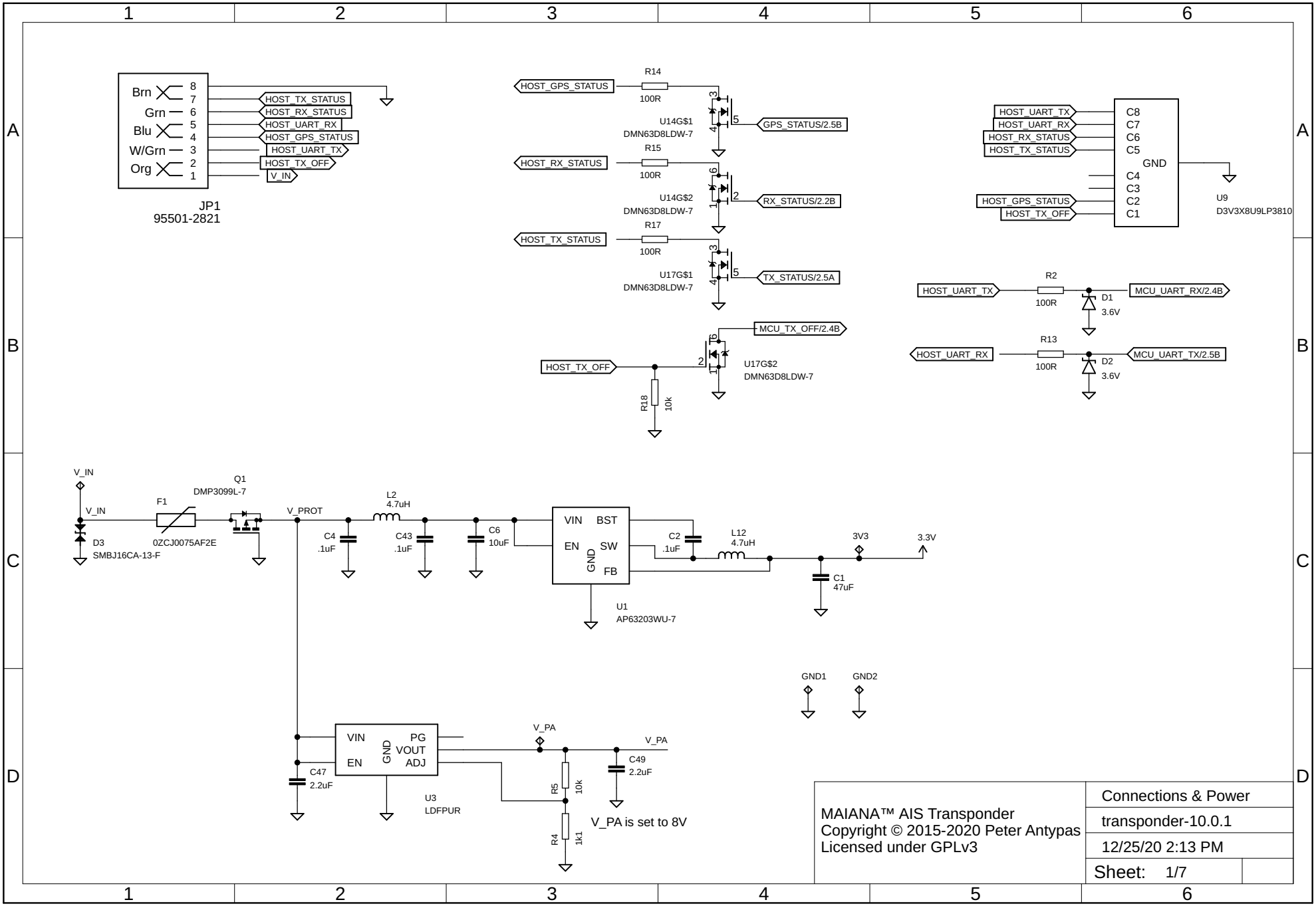
JP1
95501-2821
Brn 8
7
Grn 6
Blu 5
4
W/Grn 3
Org 2
1
HOST_TX_STATUS
HOST_RX_STATUS
HOST_UART_RX
HOST_GPS_STATUS
HOST_UART_TX
HOST_TX_OFF
V_IN
R14
100R
HOST_GPS_STATUS
U14G$1
DMN63D8LDW-7
GPS_STATUS/2.5B
R15
100R
HOST_RX_STATUS
U14G$2
DMN63D8LDW-7
RX_STATUS/2.2B
R17
100R
HOST_TX_STATUS
U17G$1
DMN63D8LDW-7
TX_STATUS/2.5A
MCU_TX_OFF/2.4B
HOST_TX_OFF
U17G$2
DMN63D8LDW-7
R18
10k
HOST_UART_TX
HOST_UART_RX
HOST_RX_STATUS
HOST_TX_STATUS
C8
C7
C6
C5
GND
C4
C3
C2
C1
HOST_GPS_STATUS
HOST_TX_OFF
U9
D3V3X8U9LP3810
R2
100R
HOST_UART_TX
D1
3.6V
MCU_UART_RX/2.4B
R13
100R
HOST_UART_RX
D2
3.6V
MCU_UART_TX/2.5B
V_IN
F1
0ZCJ0075AF2E
Q1
DMP3099L-7
D3
SMBJ16CA-13-F
V_PROT
C4
.1uF
L2
4.7uH
C43
.1uF
C6
10uF
VIN
BST
EN
SW
GND
FB
U1
AP63203WU-7
C2
.1uF
L12
4.7uH
3V3
3.3V
C1
47uF
GND1
GND2
VIN
PG
GND
VOUT
EN
ADJ
U3
LDFPUR
C47
2.2uF
V_PA
R5
10k
R4
1k1
C49
2.2uF
V_PA is set to 8V
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Connections & Power
transponder-10.0.1
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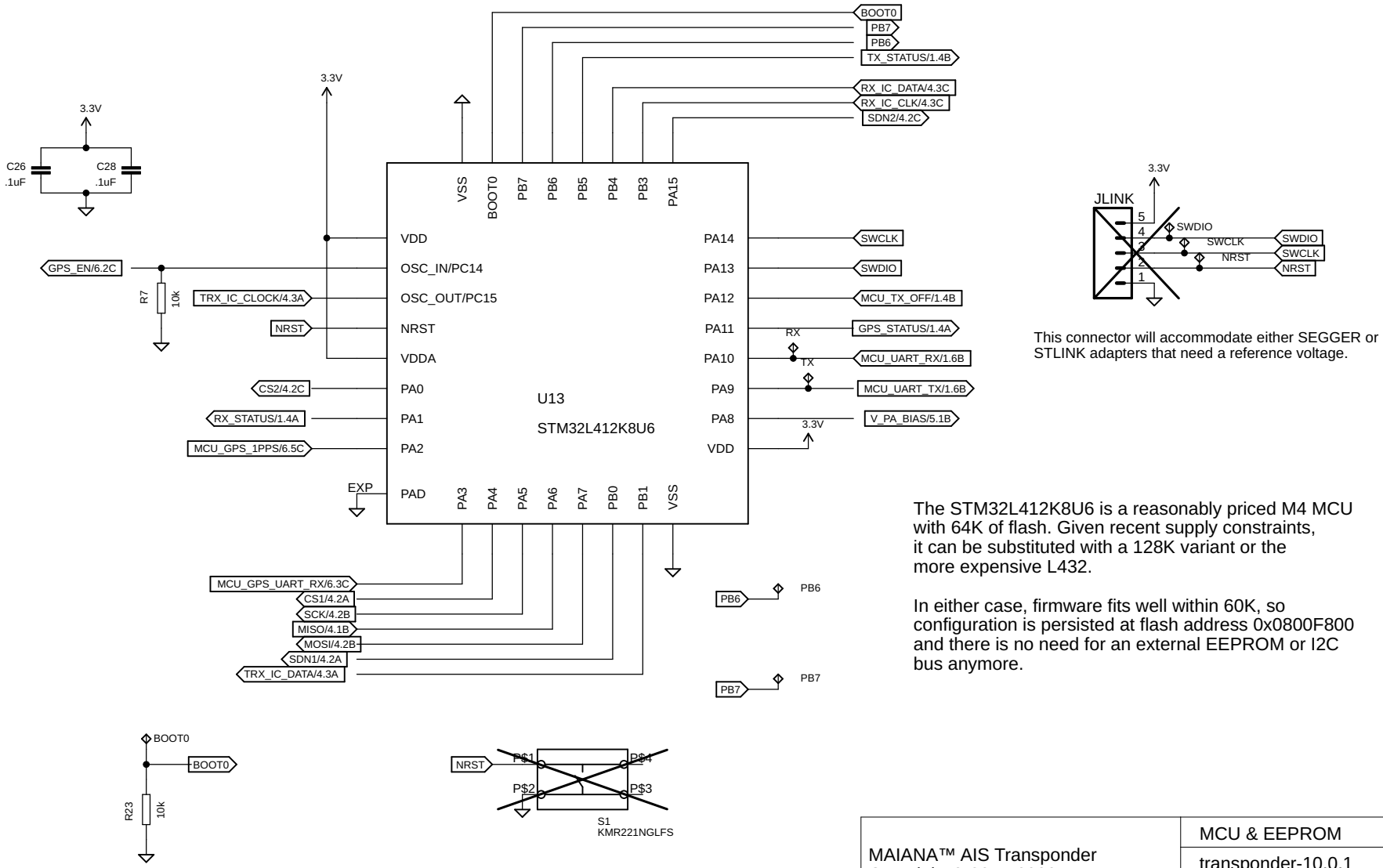

The STM32L412K8U6 is a reasonably priced M4 MCU with 64K of flash. Given recent supply constraints, it can be substituted with a 128K variant or the more expensive L432.

In either case, firmware fits well within 60K, so configuration is persisted at flash address 0x0800F800 and there is no need for an external EEPROM or I2C bus anymore.

MCU & EEPROM	
transponder-10.0.1	
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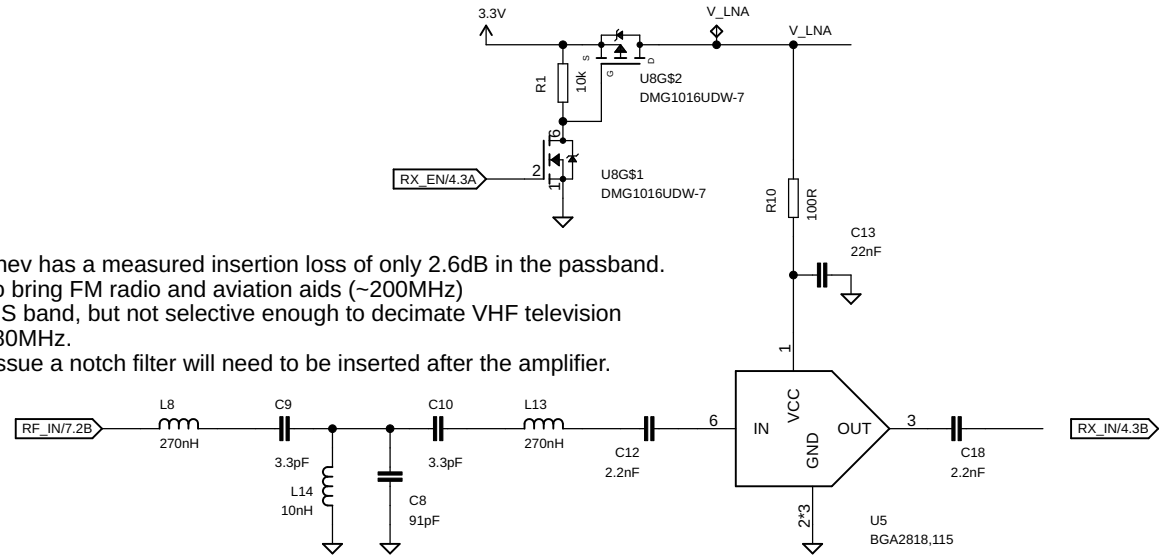
This 3-pole Chebyshev has a measured insertion loss of only 2.6dB in the passband.
It is sharp enough to bring FM radio and aviation aids (~200MHz)
near or below the AIS band, but not selective enough to decimate VHF television
between 174 and 180MHz.
If this becomes an issue a notch filter will need to be inserted after the amplifier.



LNA & Bandpass	
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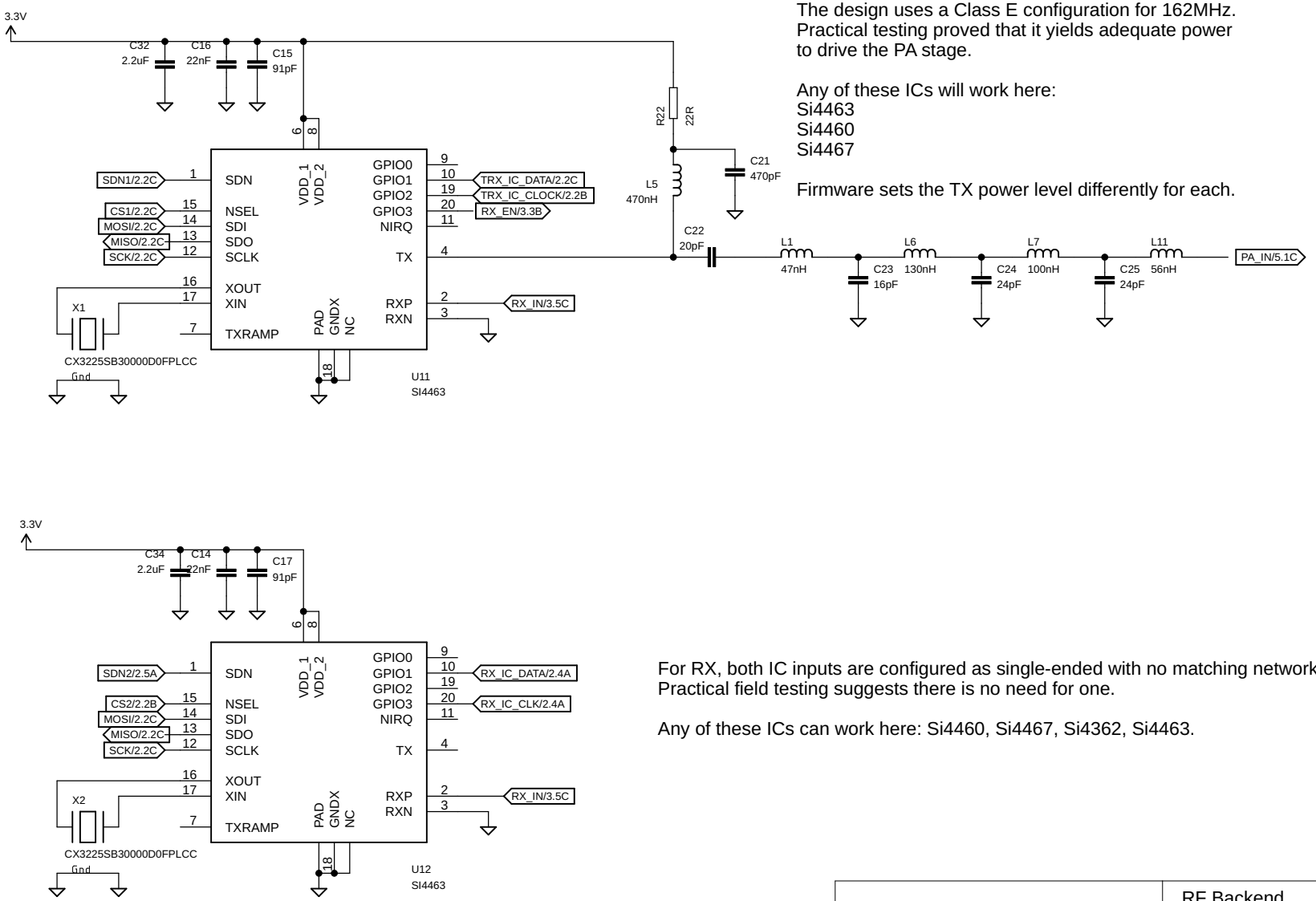

The design uses a Class E configuration for 162MHz. Practical testing proved that it yields adequate power to drive the PA stage.

Any of these ICs will work here:
Si4463
Si4460
Si4467

Firmware sets the TX power level differently for each.

For RX, both IC inputs are configured as single-ended with no matching network. Practical field testing suggests there is no need for one.

Any of these ICs can work here: Si4460, Si4467, Si4362, Si4463.

RF Backend	
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Sheet: 4/7	

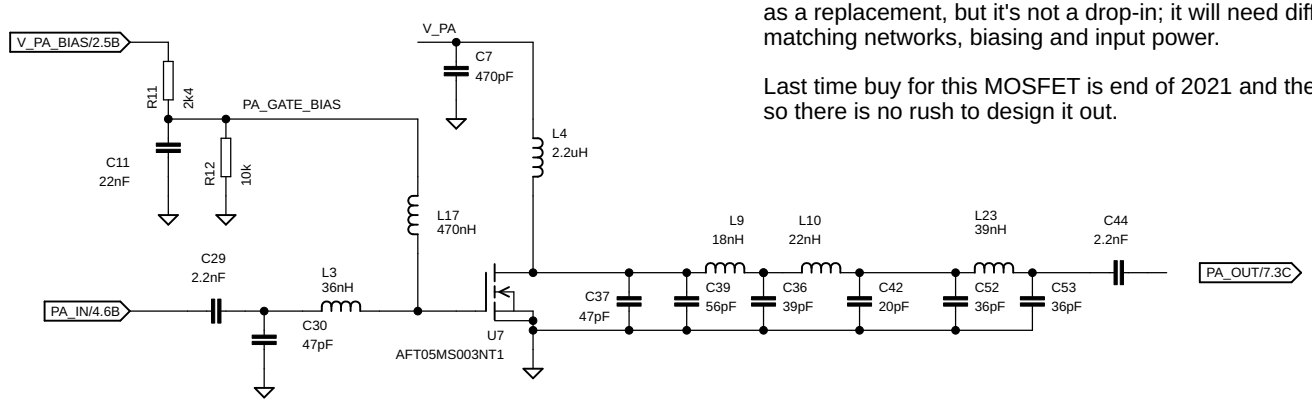
This power amplifier adds almost 20dB of gain for a total conducted output power of +33dBm.

It is based on the reference designs in the datasheet, but includes a narrowband input matching network to reduce BOM and a very steep Chebyshev low pass filter to deal with a pesky 2nd harmonic that falls in the restricted aviation band (324MHz).

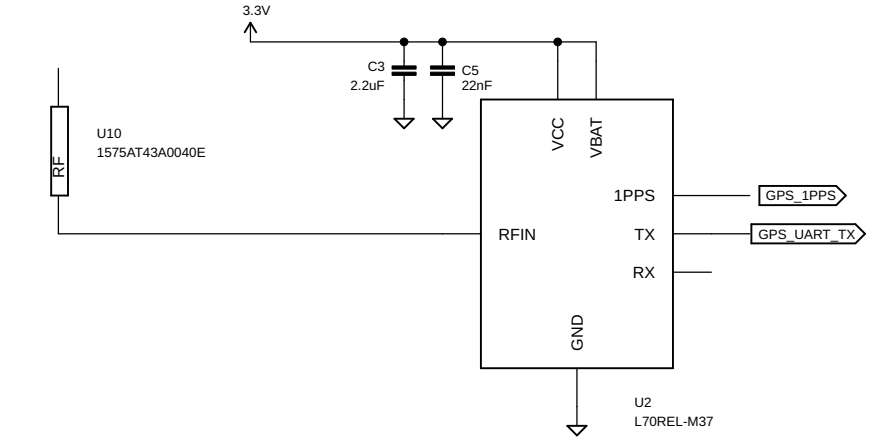
The MOSFET drain is always powered, but the gate bias voltage is turned on via R11, R12, C11 and L17. The RC delay is essential for suppressing spurious emissions during ramp up and ramp down.

This MOSFET is at End Of Life. NXP recommends the AFT05MS004N as a replacement, but it's not a drop-in; it will need different matching networks, biasing and input power.

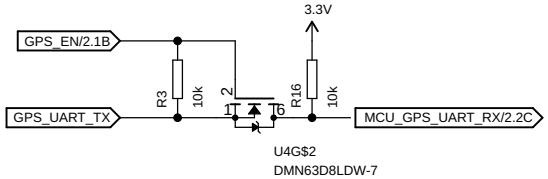
Last time buy for this MOSFET is end of 2021 and there is ample supply, so there is no rush to design it out.

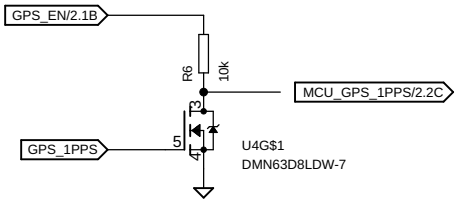


MAIANA™ AIS Transponder Copyright © 2015-2020 Peter Antypas Licensed under GPLv3	RF Power Amplifier
	transponder-10.0.1
	12/25/20 2:13 PM
	Sheet: 5/7



This buffer enables DFU via the ROM bootloader, as it effectively shuts down the GPS UART without powering the module off. GPS_EN is pulled down in hardware and only firmware can push it high.





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	transponder-10.0.1
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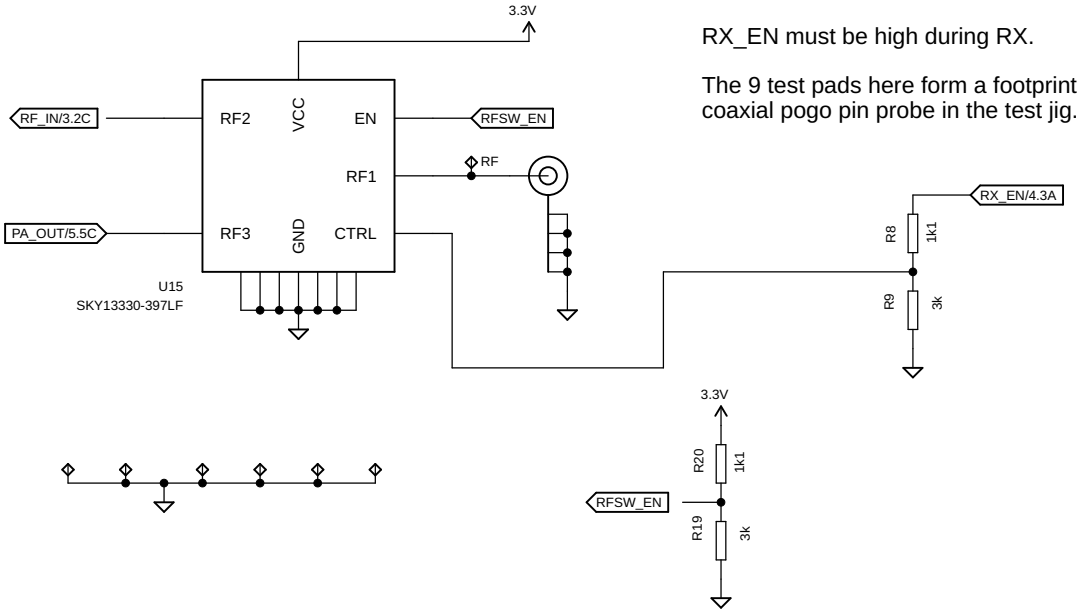
	Sheet: 6/7

This switch does not need DC blocking caps, but control signals must be below 2.7V.

RX_EN must be high during RX.

The 9 test pads here form a footprint for a coaxial pogo pin probe in the test jig.



Antenna Switch	
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