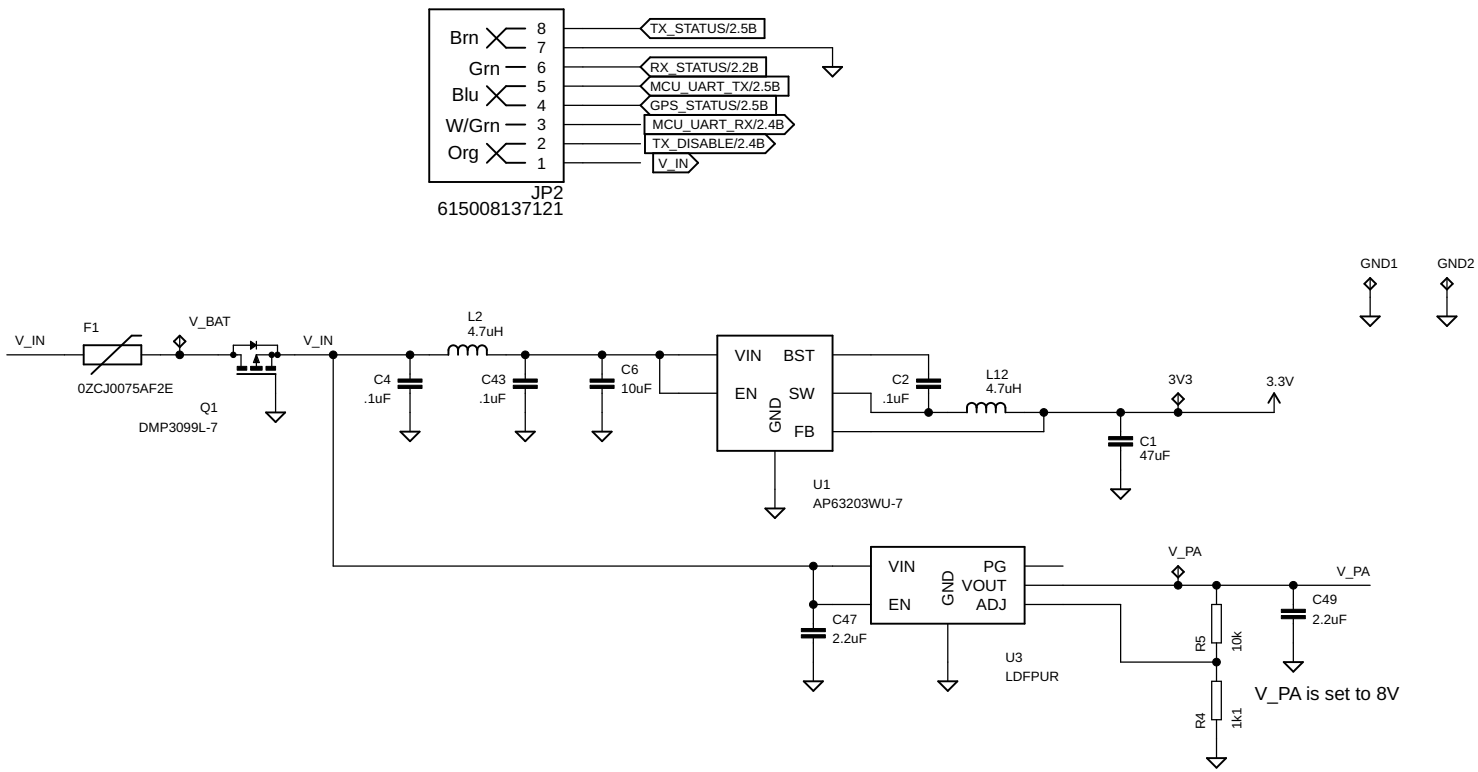
The RJ45 is optional. You can mount a 4-pin 0.1" pitch Phoenix terminal on pins 1,3,5 and 7 and use a 4-wire (phone) cable instead.

It will give you the most important signals and reduce the cable diameter.



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	transponder-9.3.0
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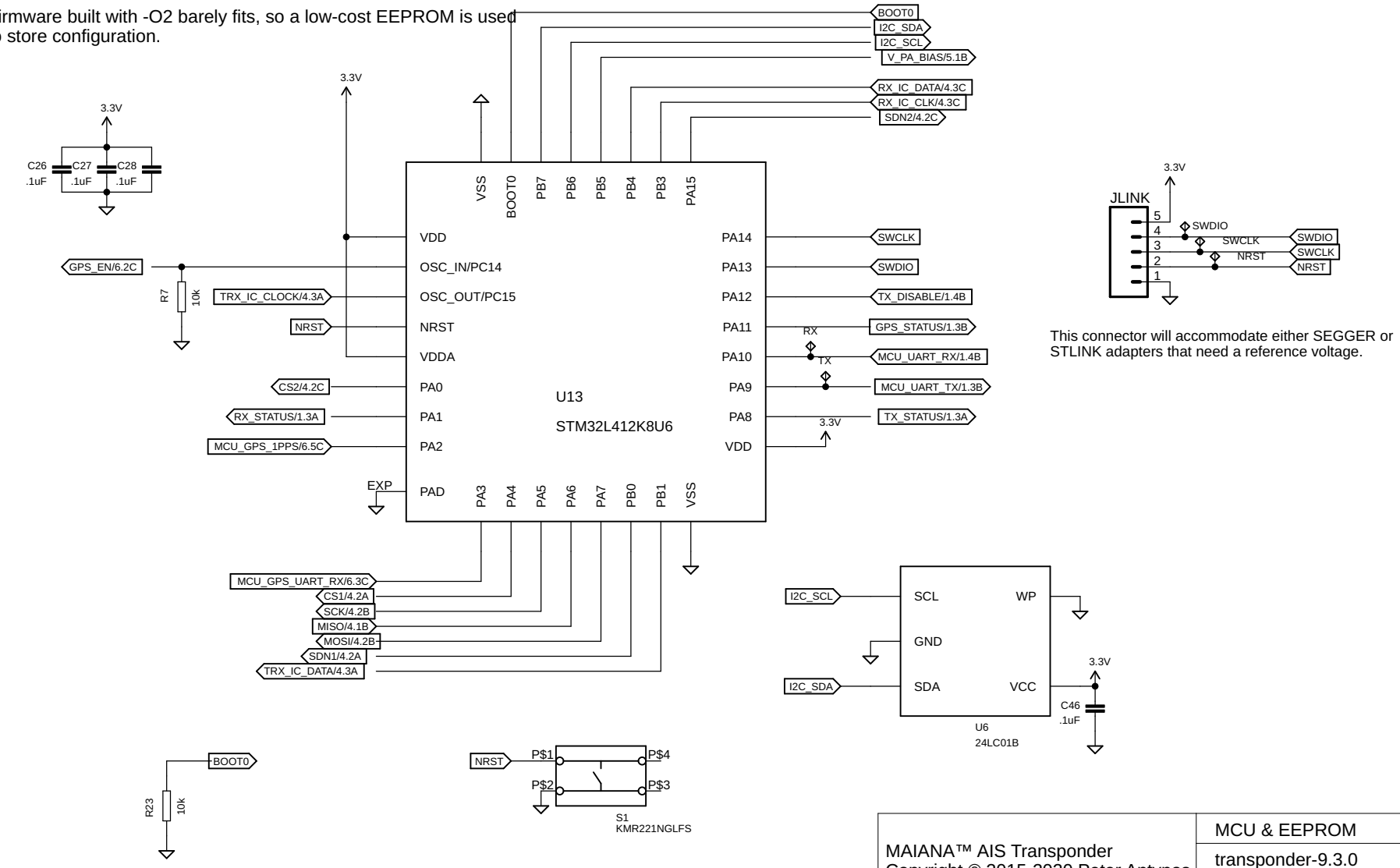
The STM32L412K8U6 is a reasonably priced M4 MCU with 64K of flash.

Firmware built with -O2 barely fits, so a low-cost EEPROM is used to store configuration.



This connector will accommodate either SEGGER or STLINK adapters that need a reference voltage.

MCU & EEPROM	
transponder-9.3.0	
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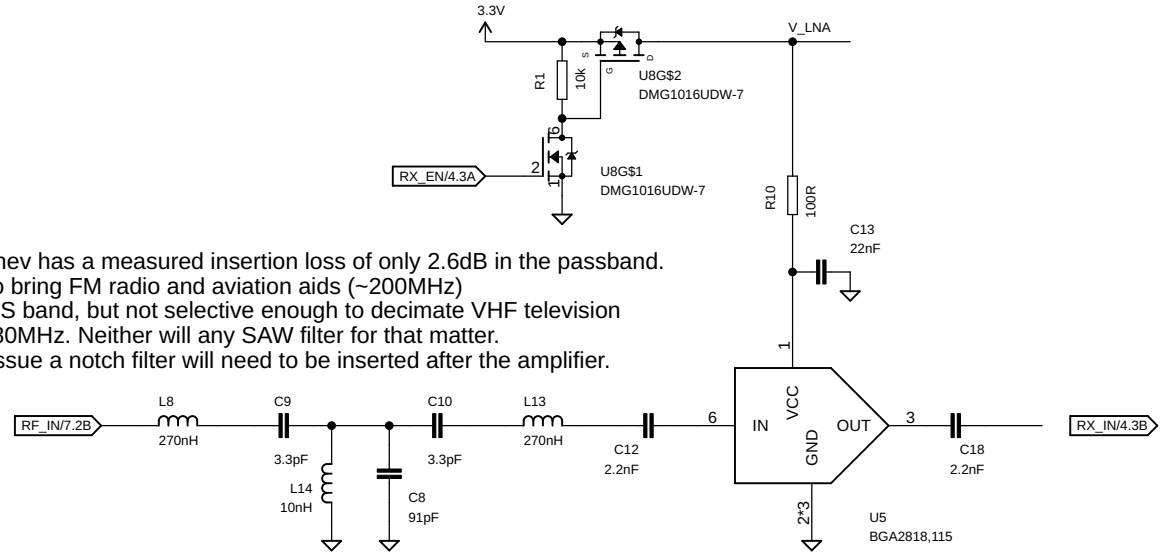
This 3-pole Chebyshev has a measured insertion loss of only 2.6dB in the passband.
It is sharp enough to bring FM radio and aviation aids (~200MHz)
near or below the AIS band, but not selective enough to decimate VHF television
between 174 and 180MHz. Neither will any SAW filter for that matter.
If this becomes an issue a notch filter will need to be inserted after the amplifier.



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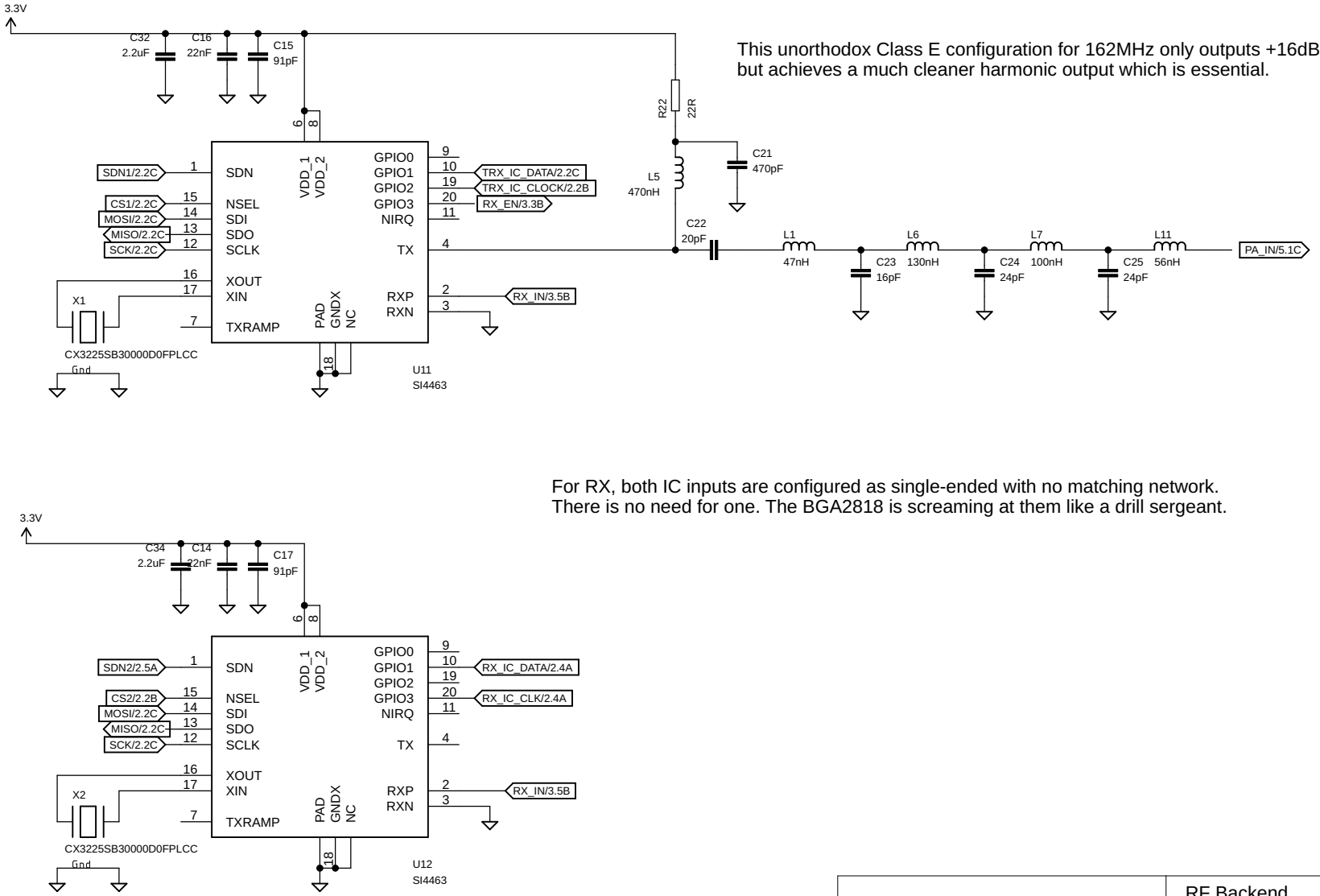

MAIANA™ AIS Transponder

RF Backend	
transponder-9.3.0	
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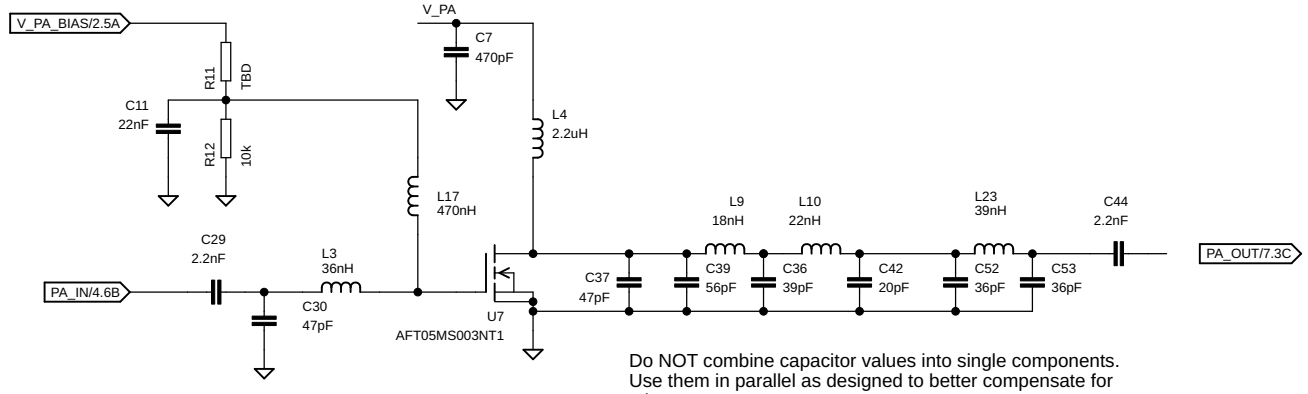
This power amplifier adds more than 17dB of gain for a total conducted output power of +33dBm.

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 and C11. The RC delay is essential for suppressing spurious emissions during ramp up and ramp down.

To calibrate output power, it is necessary to play with the value of R11. A good starting point is 3K, and it may need to go as low as 1.8K. Most boards seem to settle around 2.4K.

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. On the upside, that part is more efficient and capable of 5W output, so it might be possible to support a B+ variant.



Do NOT combine capacitor values into single components. Use them in parallel as designed to better compensate for tolerances.

MAIANA™ AIS Transponder Copyright © 2015-2020 Peter Antypas Licensed under GPLv3	RF Power Amplifier
	transponder-9.3.0
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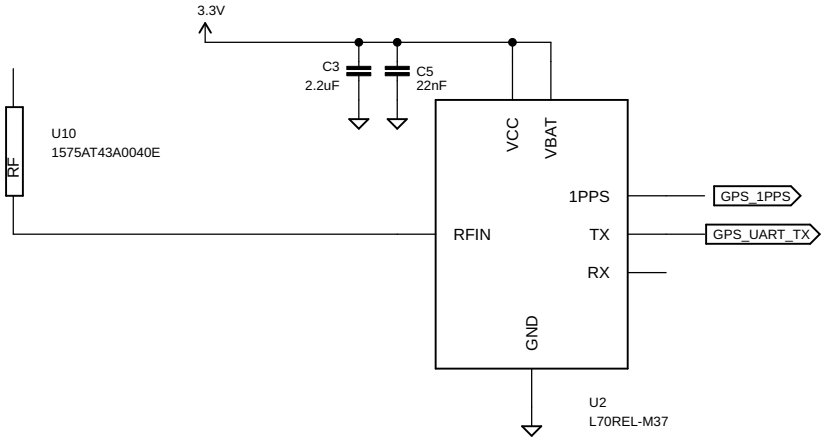
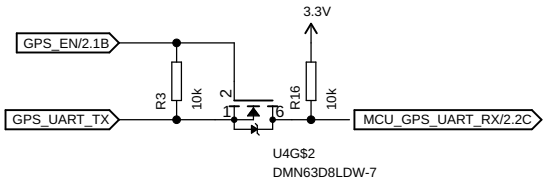
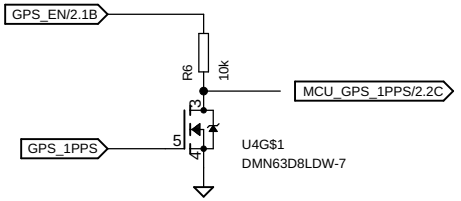


This buffer enables DFU via the ROM bootloader, as it effectively shuts down the GPS UART without powering the module off. GPS_EN is pulled down in hardware and only firmware can push it high.





MAIANA™ AIS Transponder

GPS	
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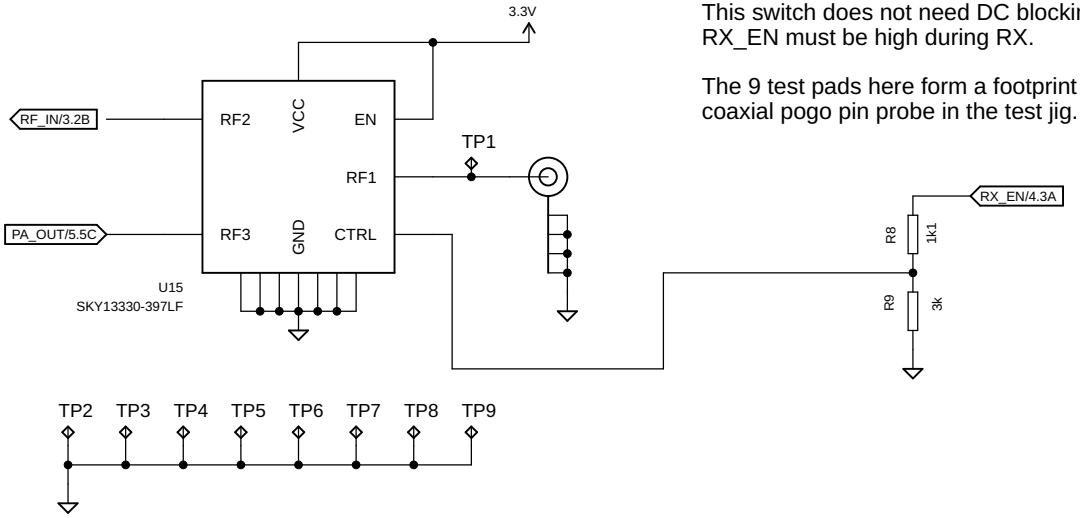

This switch does not need DC blocking caps.
RX_EN must be high during RX.

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

Antenna Switch	
transponder-9.3.0	
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