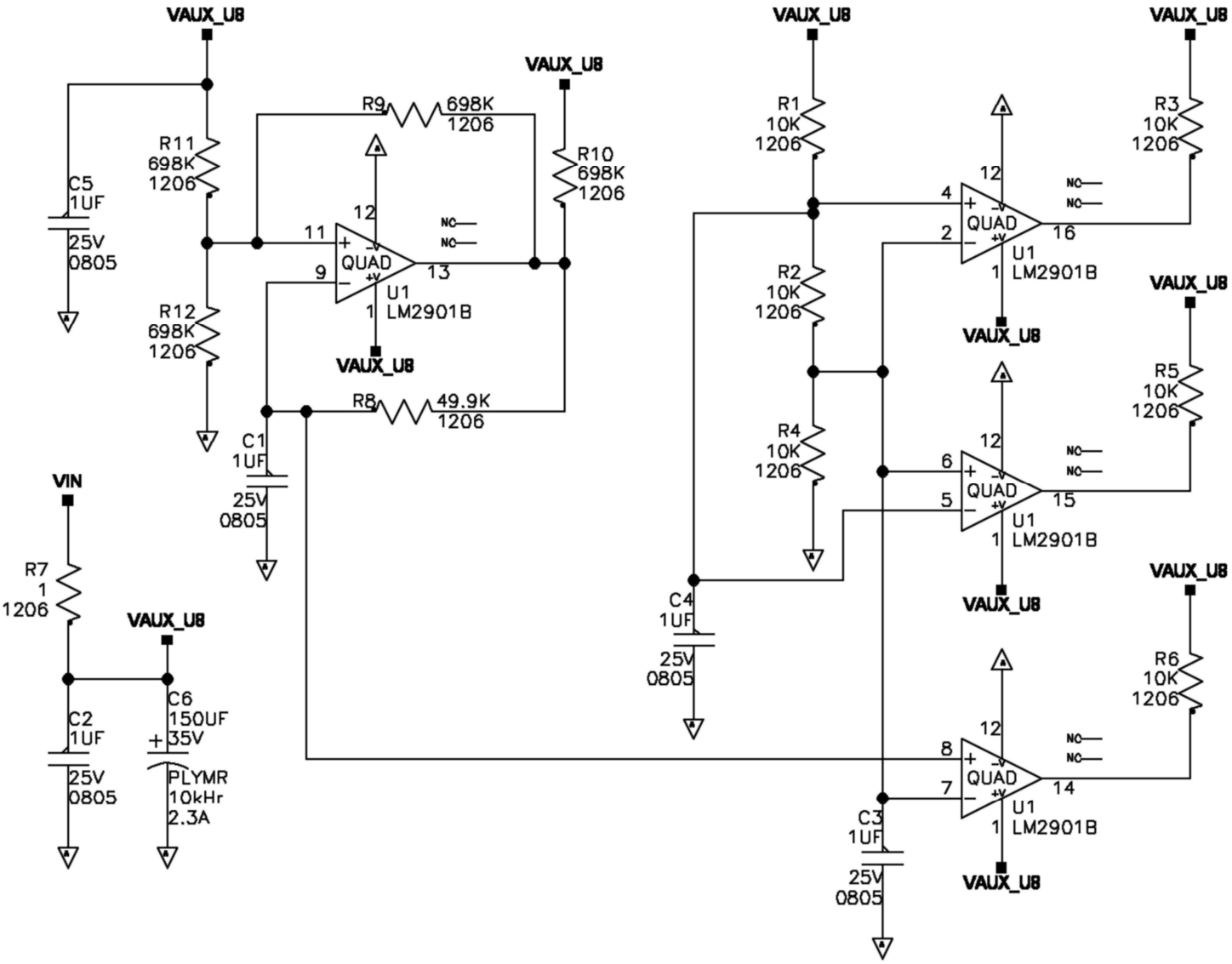
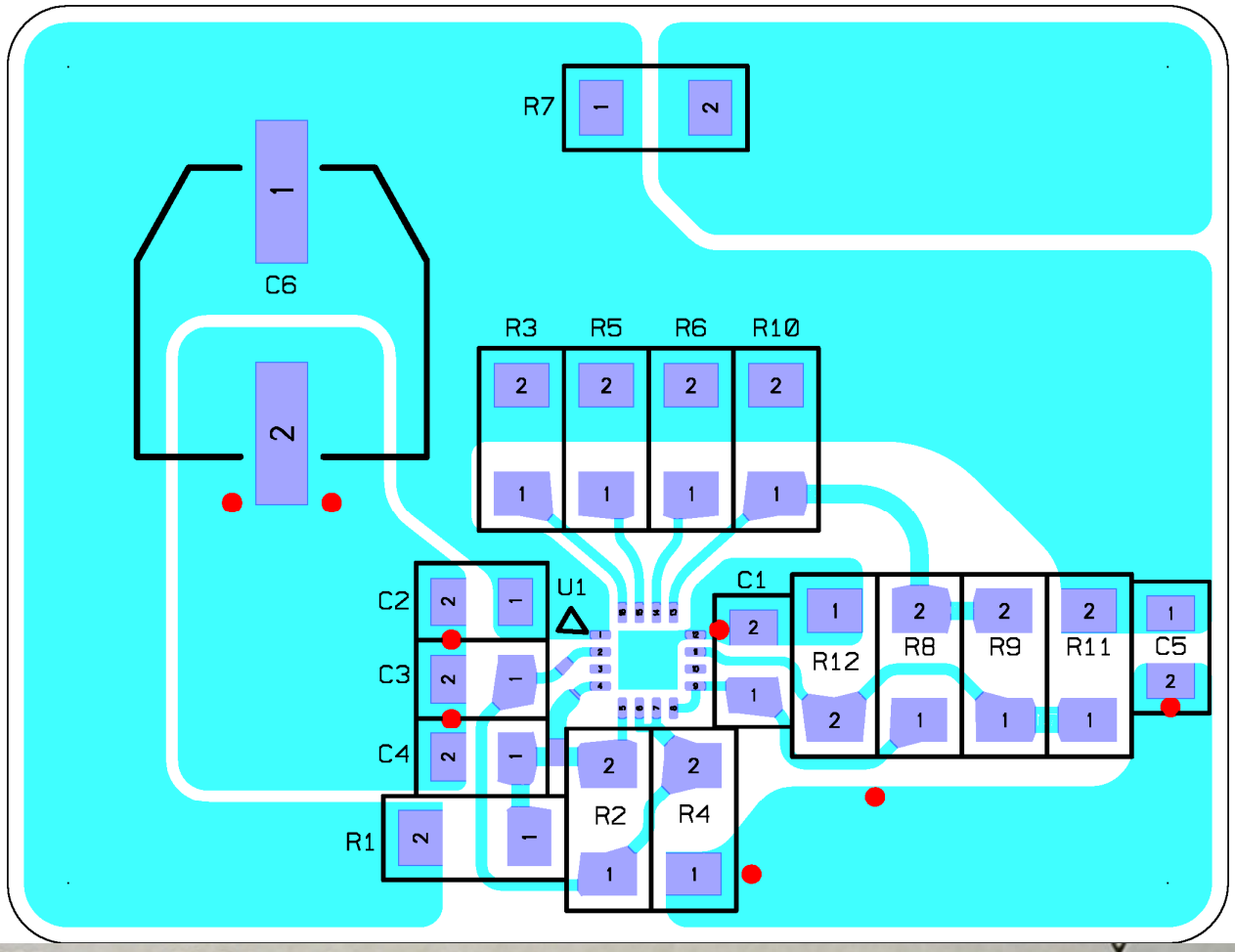
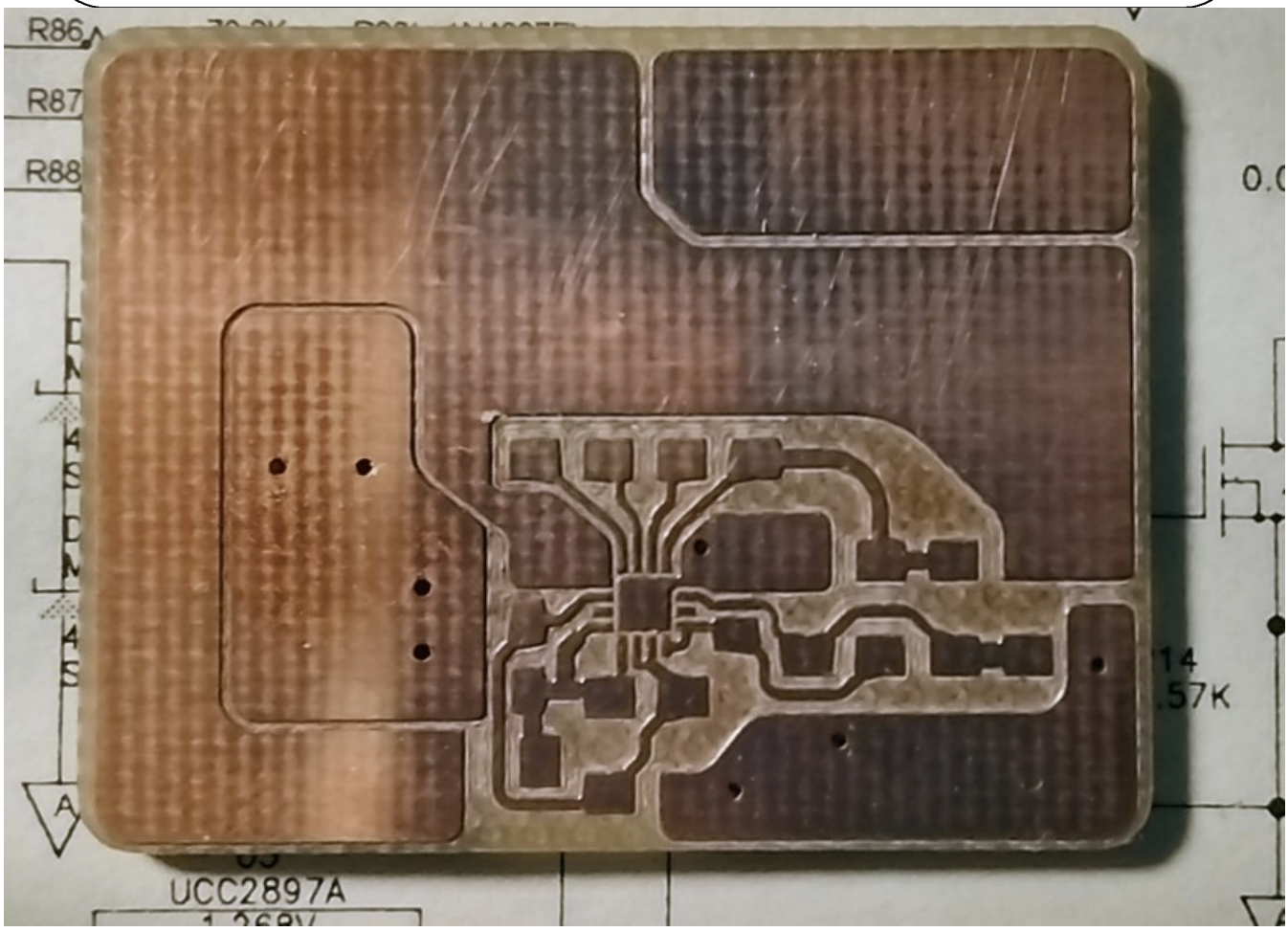
Test board milled today to check negative output pulses on the LM2901BIRTER.

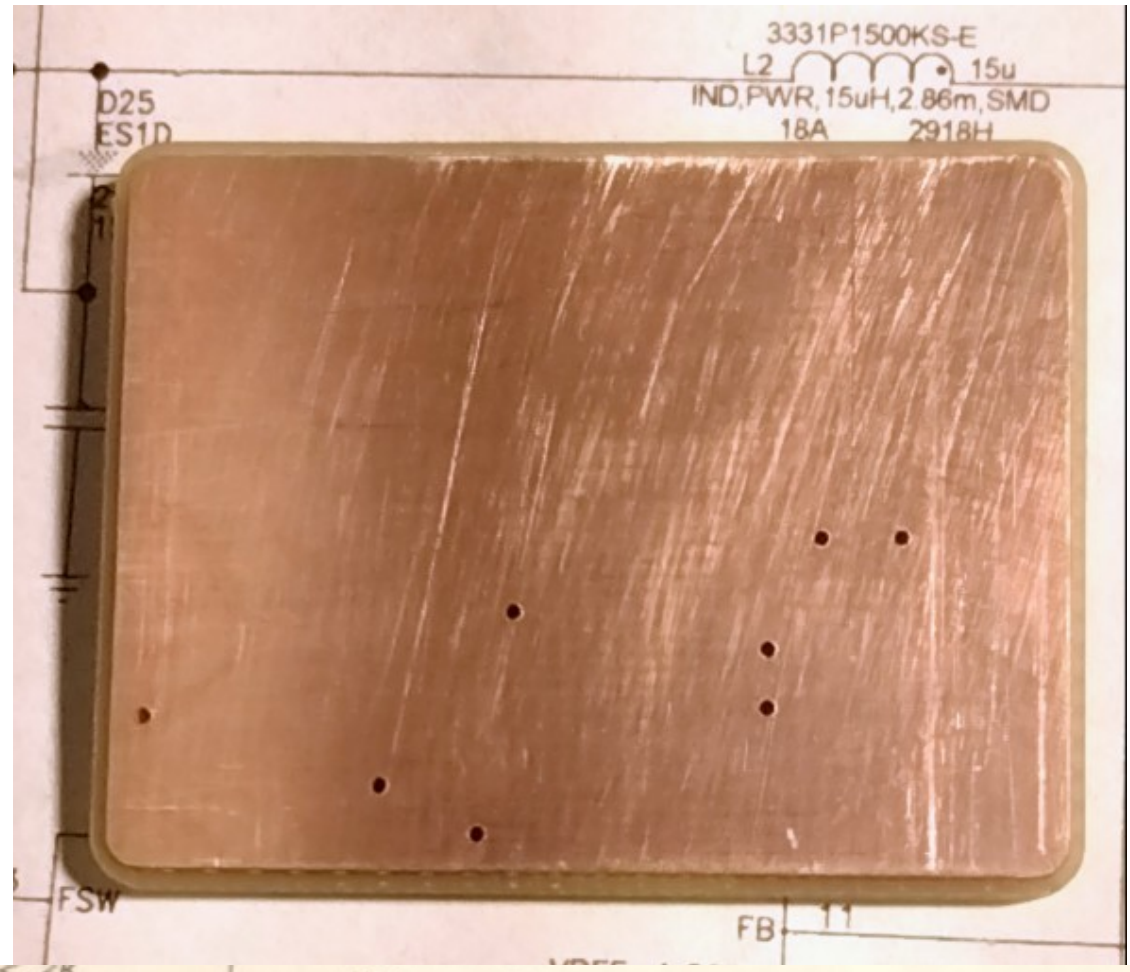
Simple schematic for this test. Below is the entire schematic and the only parts on the test board.

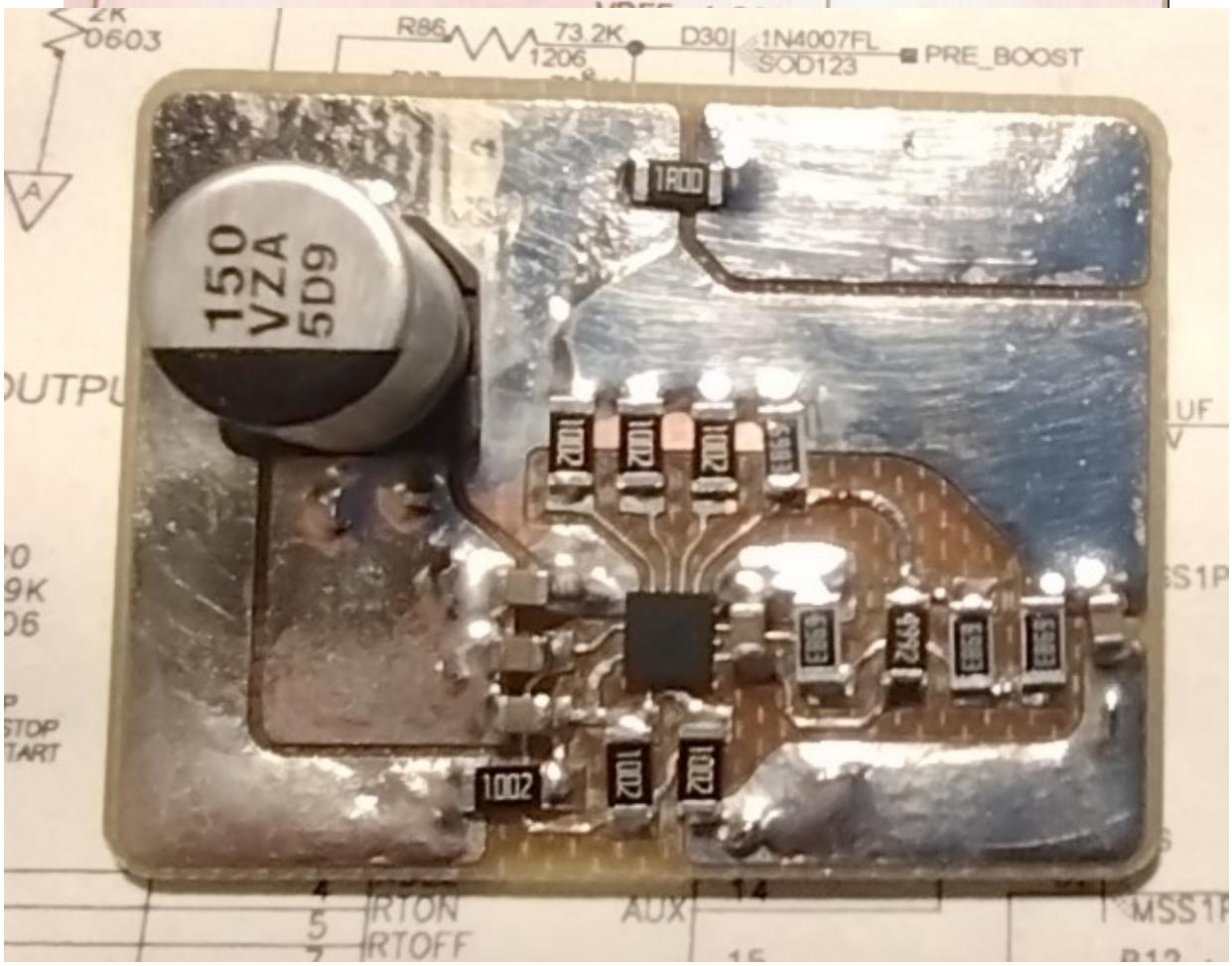
VIN is a DC lab supply. Three comparators on the right are static biased and do not change state (R1 was changed to 20 kΩ after schematic and photos taken). Two outputs are always high and one output is always low. Only one comparator is oscillating.




R7
C6
R3
R5
R6
R10
C2
C3
C4
R1
U1
C1
R12
R8
R9
R11
C5
R2
R4

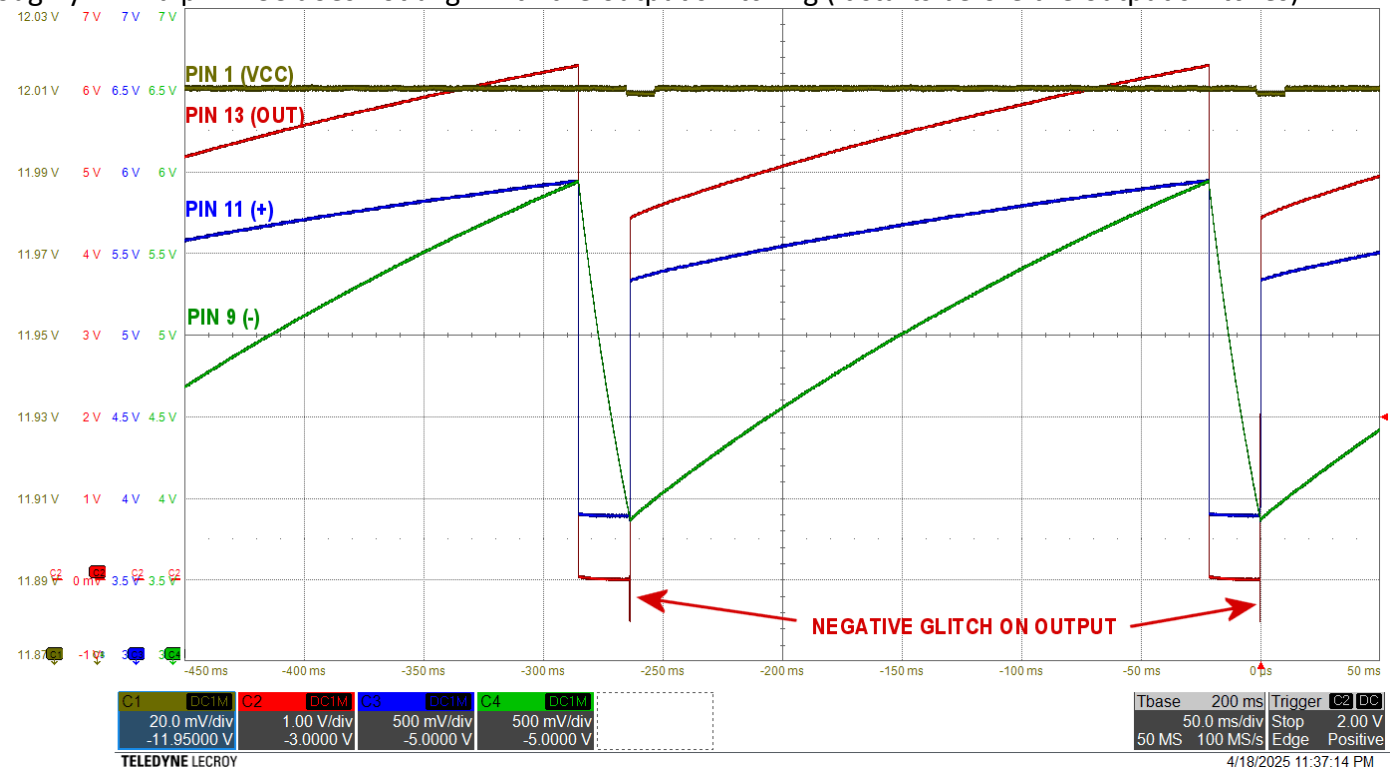

R86
R87
R88
UCC2897A


3331P1500KS-E
L2
15u
IND,PWR,15uH,2.86m,SMD
18A
2918H
D25
ES1D
FSW
FB
11

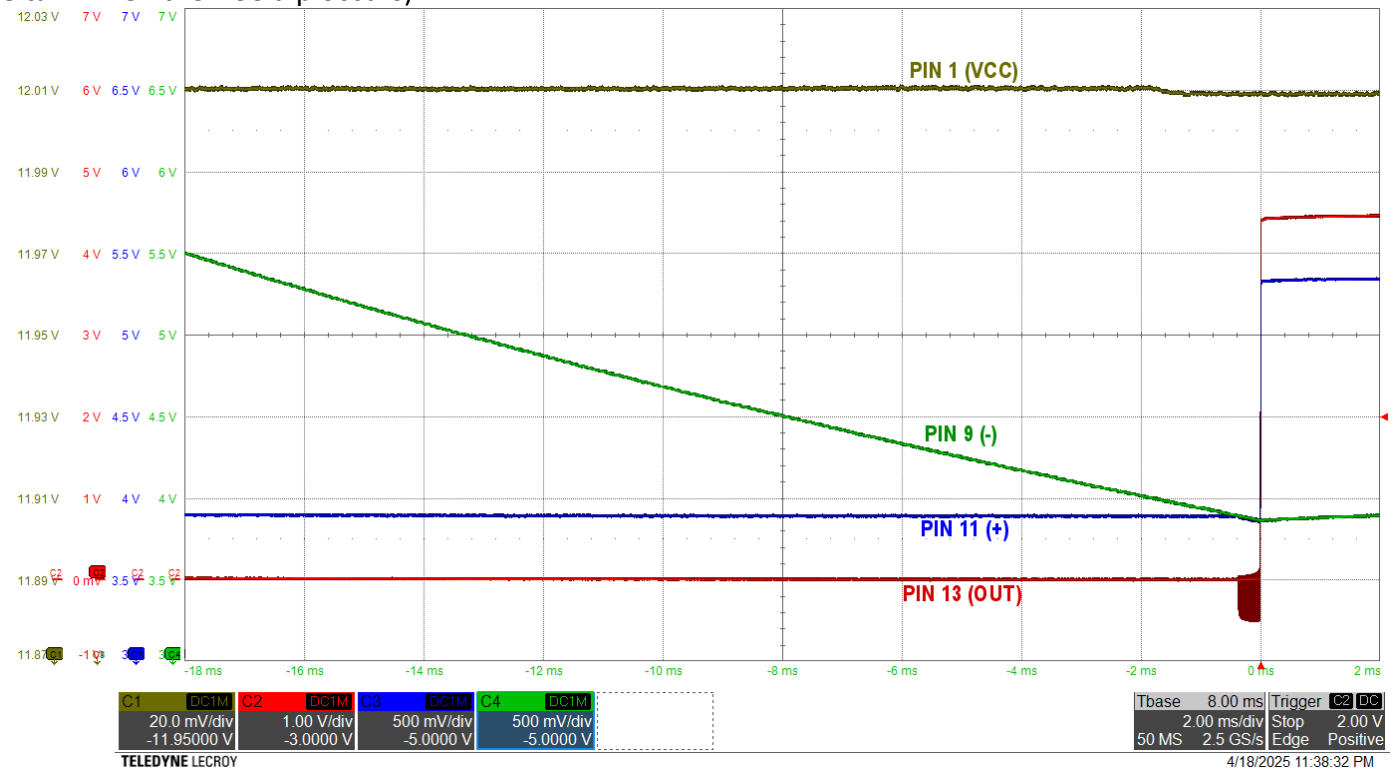

R86
73.2K
1206
D30
1N4007FL
SOD123
PRE_BOOST
0603
150
VZA
5D9
1A00
1002
RTON
RTOFF
AUX
14

All scope traces below are Full Bandwidth, no filtering, no averaging.
LeCroy HDO6104 12 bit, 1 GHz, 2.5 GS/s, 500 MHz passive probes (stripped down).

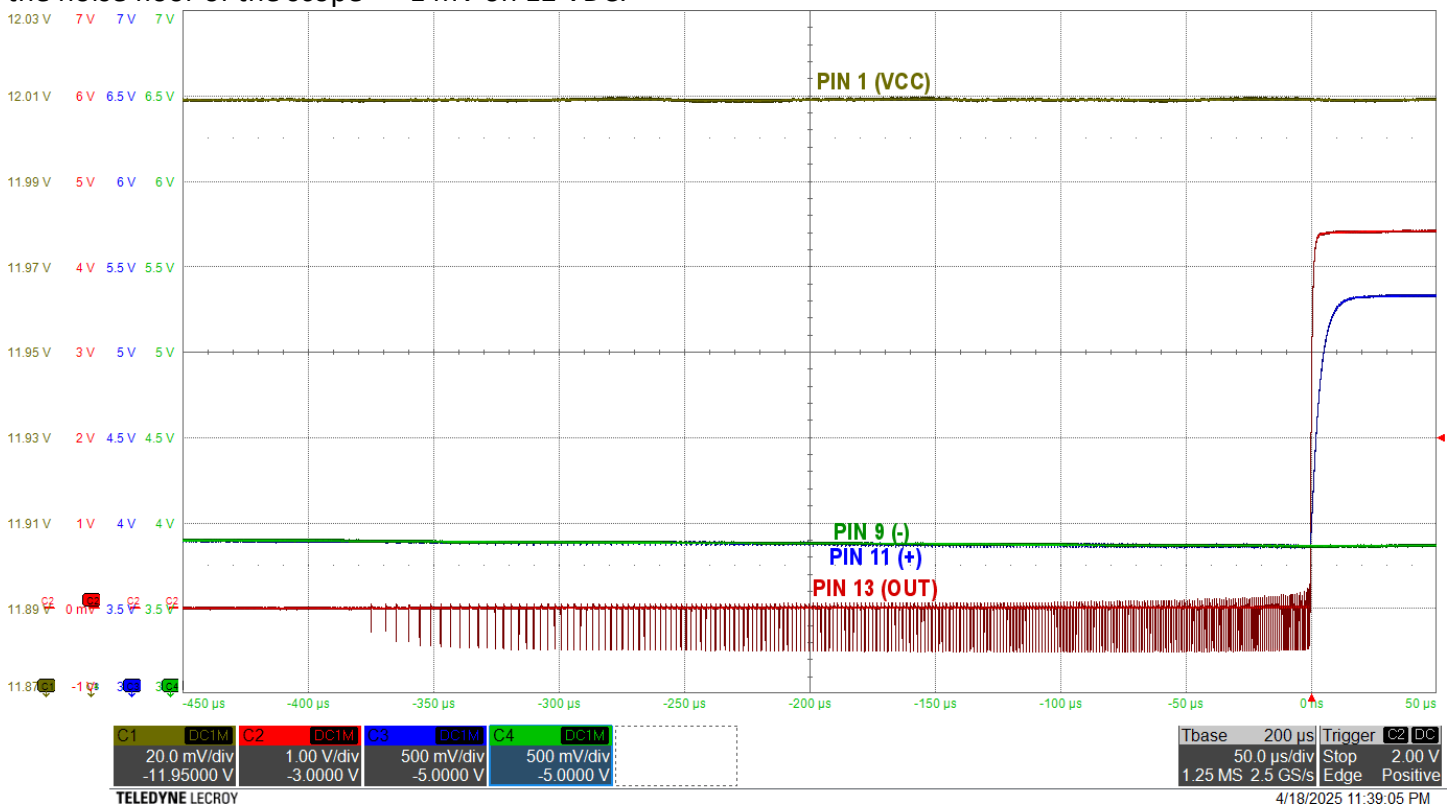
Scope 03_01: Wide timescale showing negative glitch. VCC timescale is 20 mV/div. VCC pk-pk is << 5 mV. The roughly 2mV dip in VCC does not align with the output switching (it starts before the output switches).



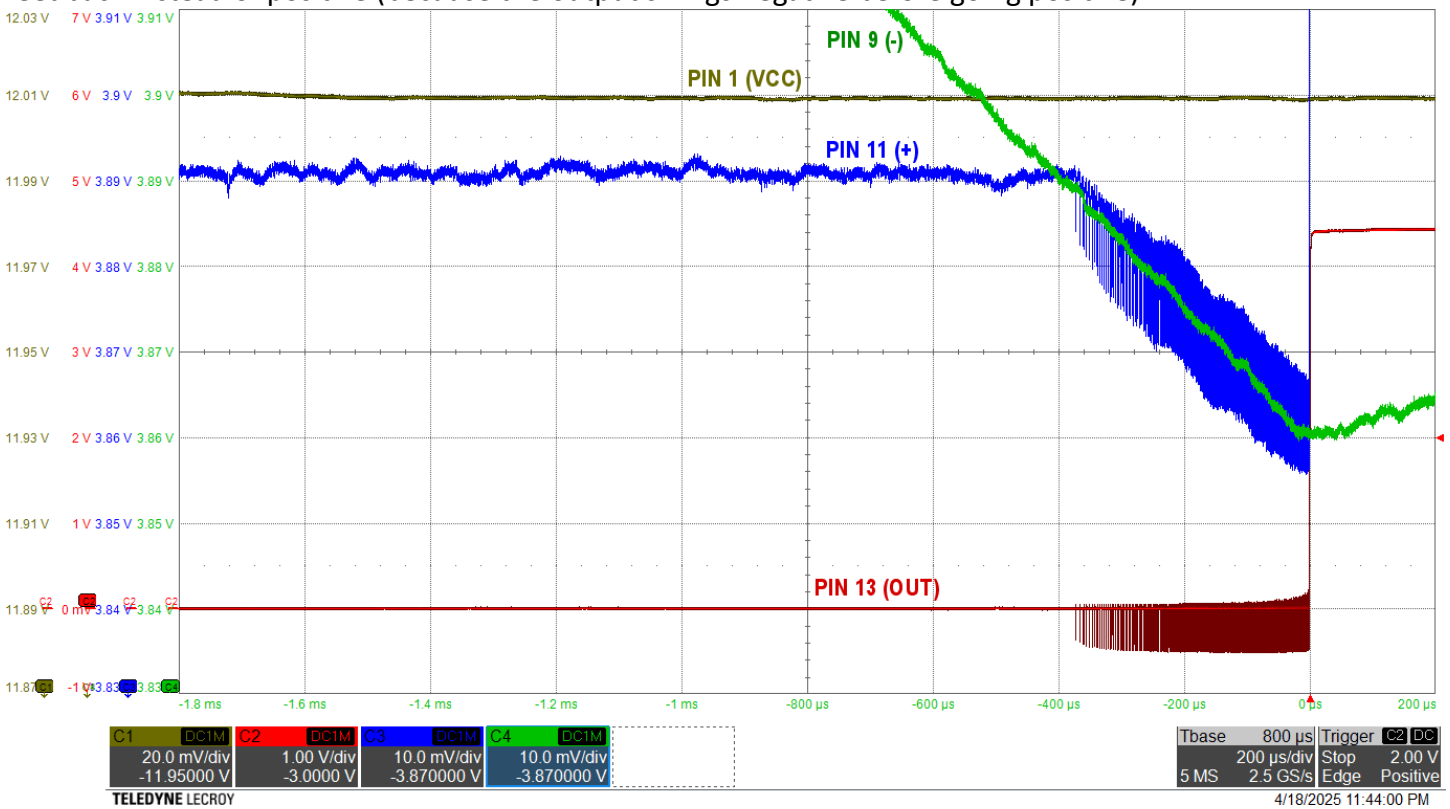
Scope 03_02: Zooming in we see the negative glitch is actually several negative pulses…a keen eye can see the negative pulses driving the non-inverting pin lower (negative feedback instead of positive feedback through the hysteresis resistor. The 1-2 mV dip in VCC occurs before the output switches (the input pins have ~100 mV delta V when the VCC dip occurs).



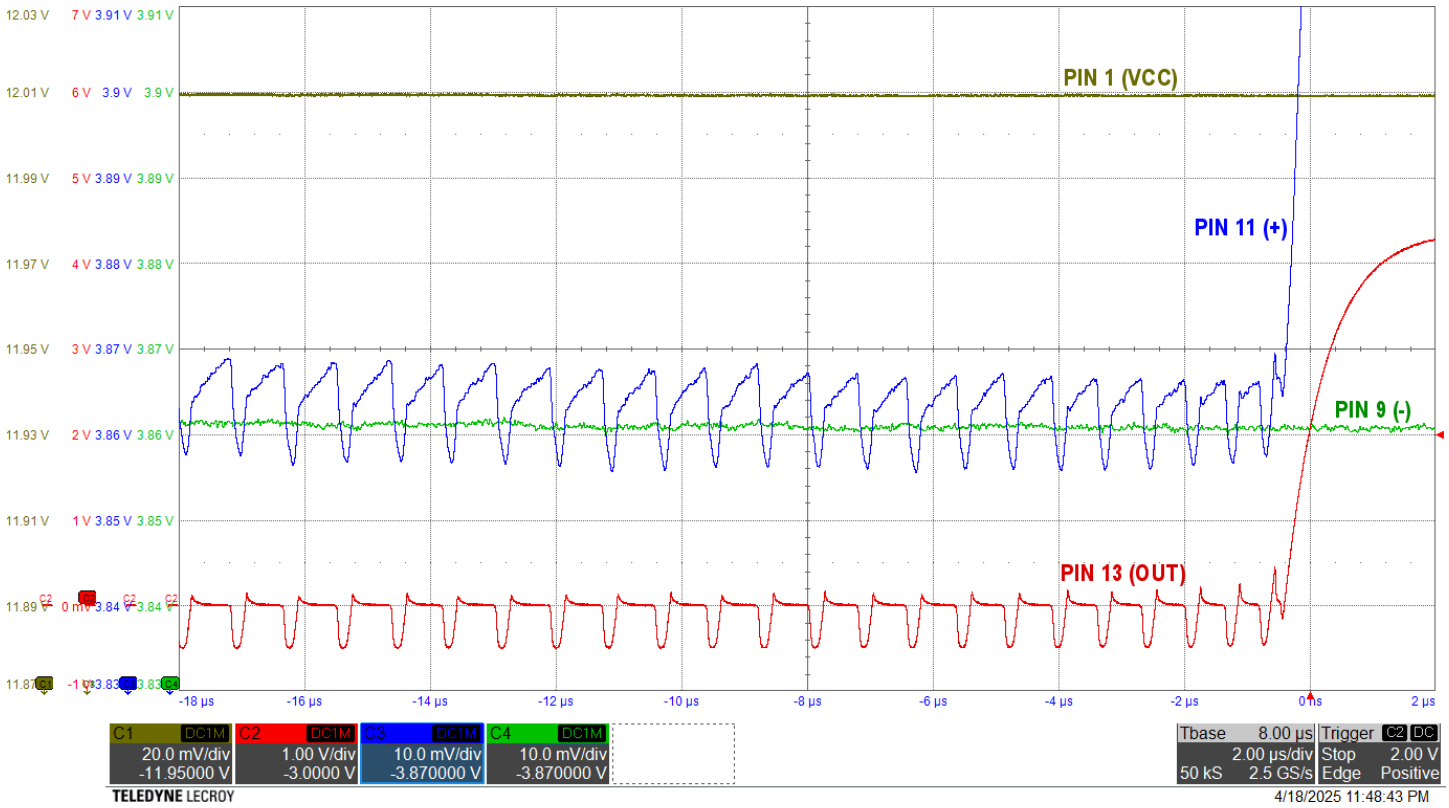
Scope 03_03: Closer zoom showing the multiple negative spikes before finally going positive. VCC ripple is in the noise floor of the scope << 1 mV on 12 VDC.



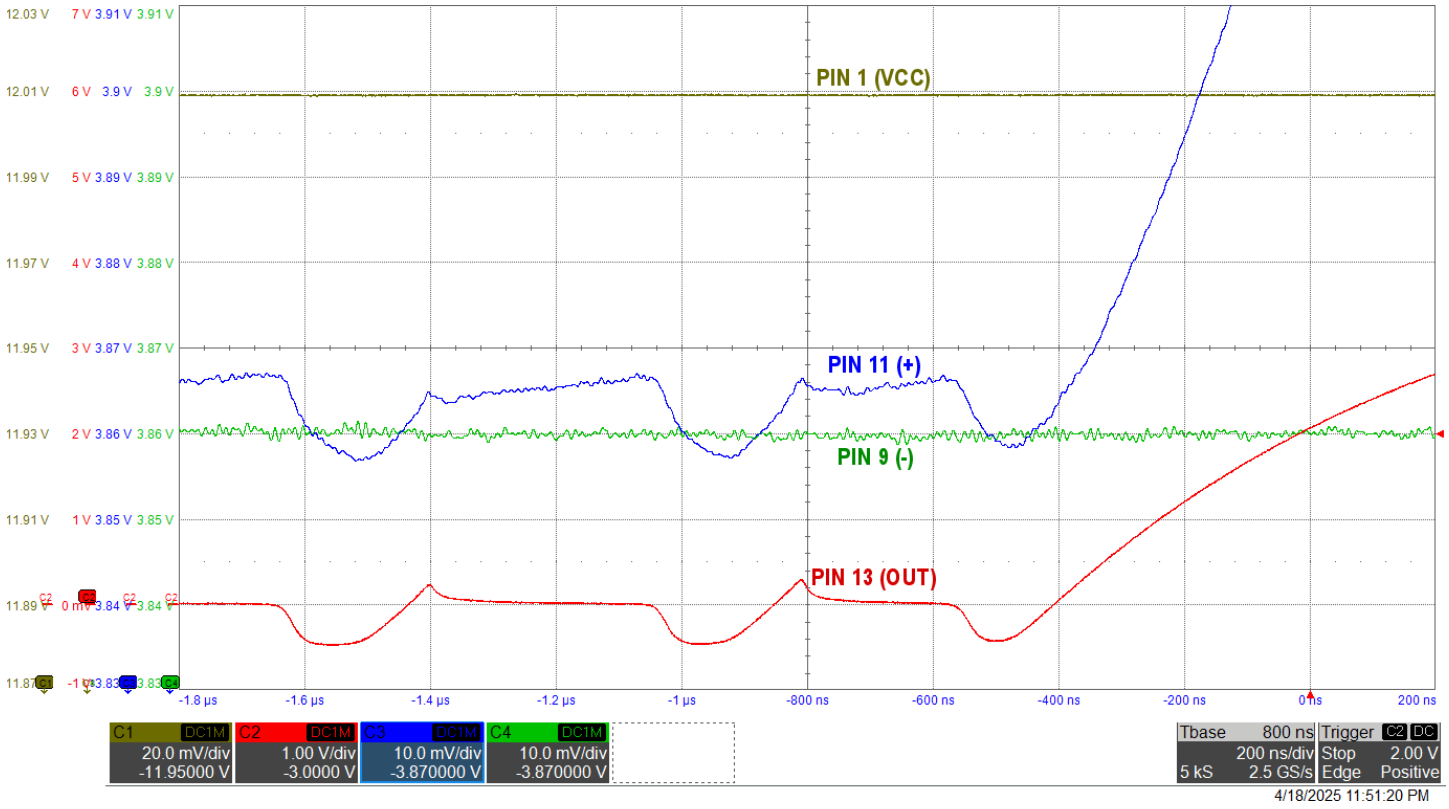
Scope 03_04: Scale change on inputs. Shows shift in trip point due to hysteresis resistor providing negative feedback instead of positive (because the output swings negative before going positive).



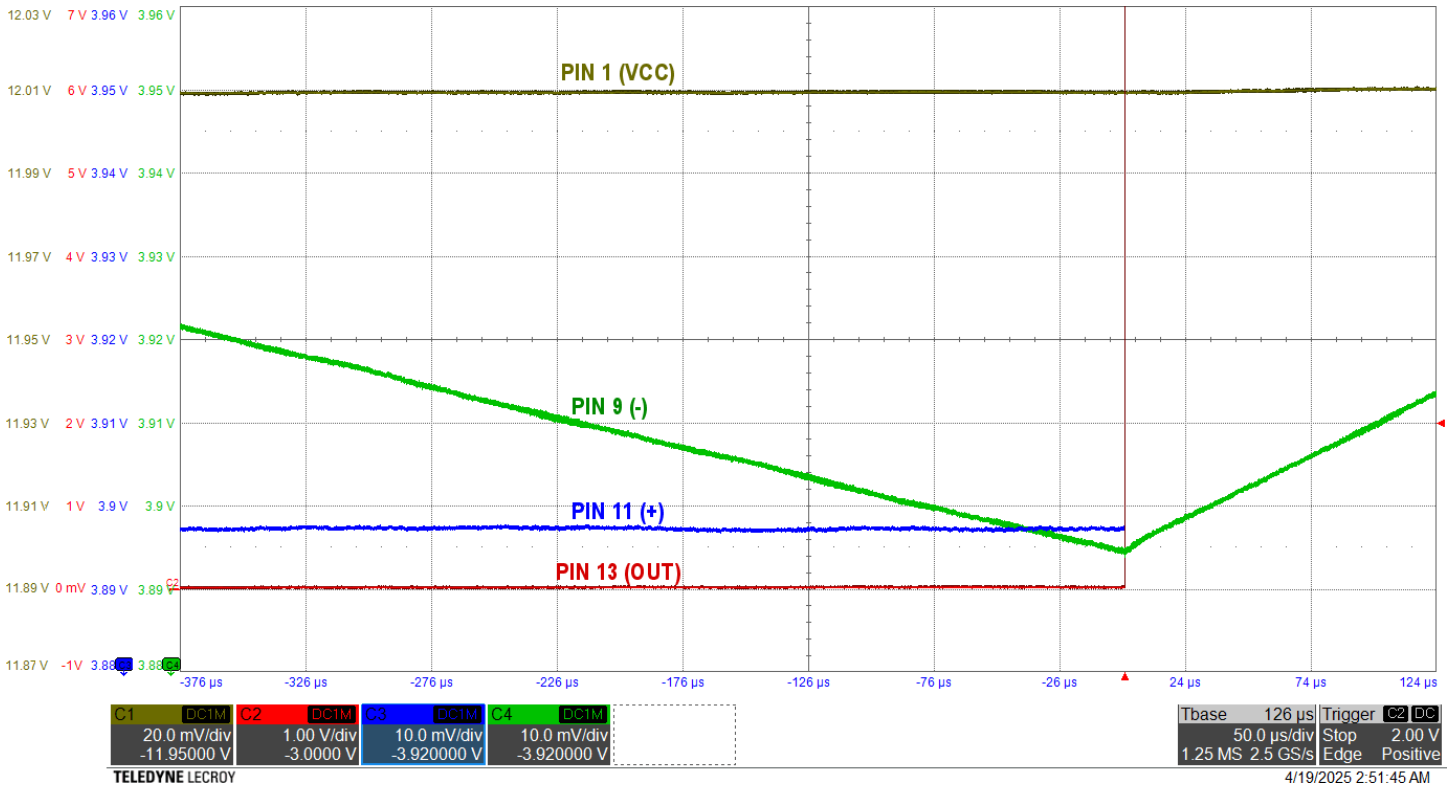
Scope 03_05: Horizontal zoom to show negative pulses slightly prior to output going high.



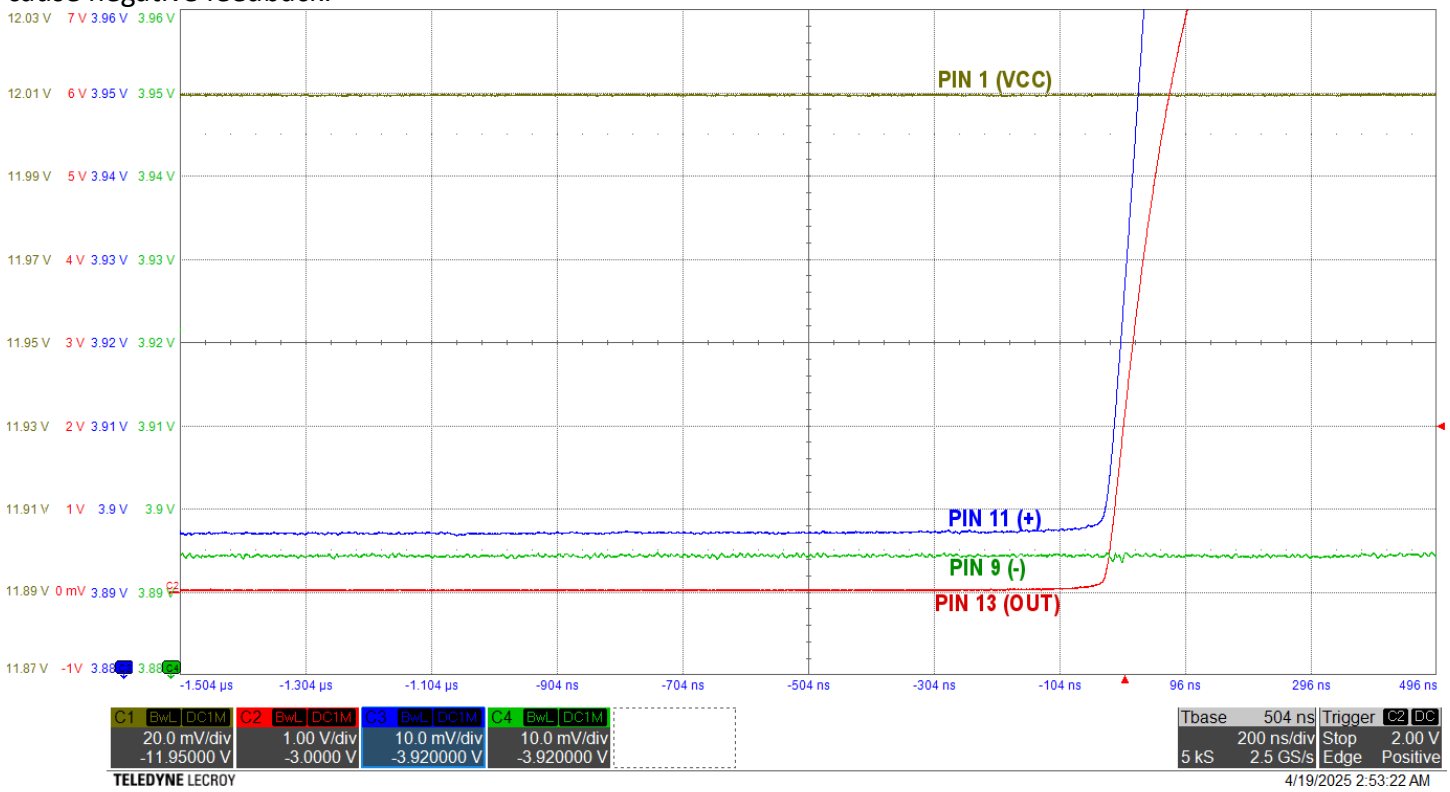
Scope 03_06: Even closer zoom. Clearly shows the negative feedback through the hysteresis resistor.



Scope 03_07: R10 pullup changed to 10 kΩ. No negative output pulses. Behavior as expected.

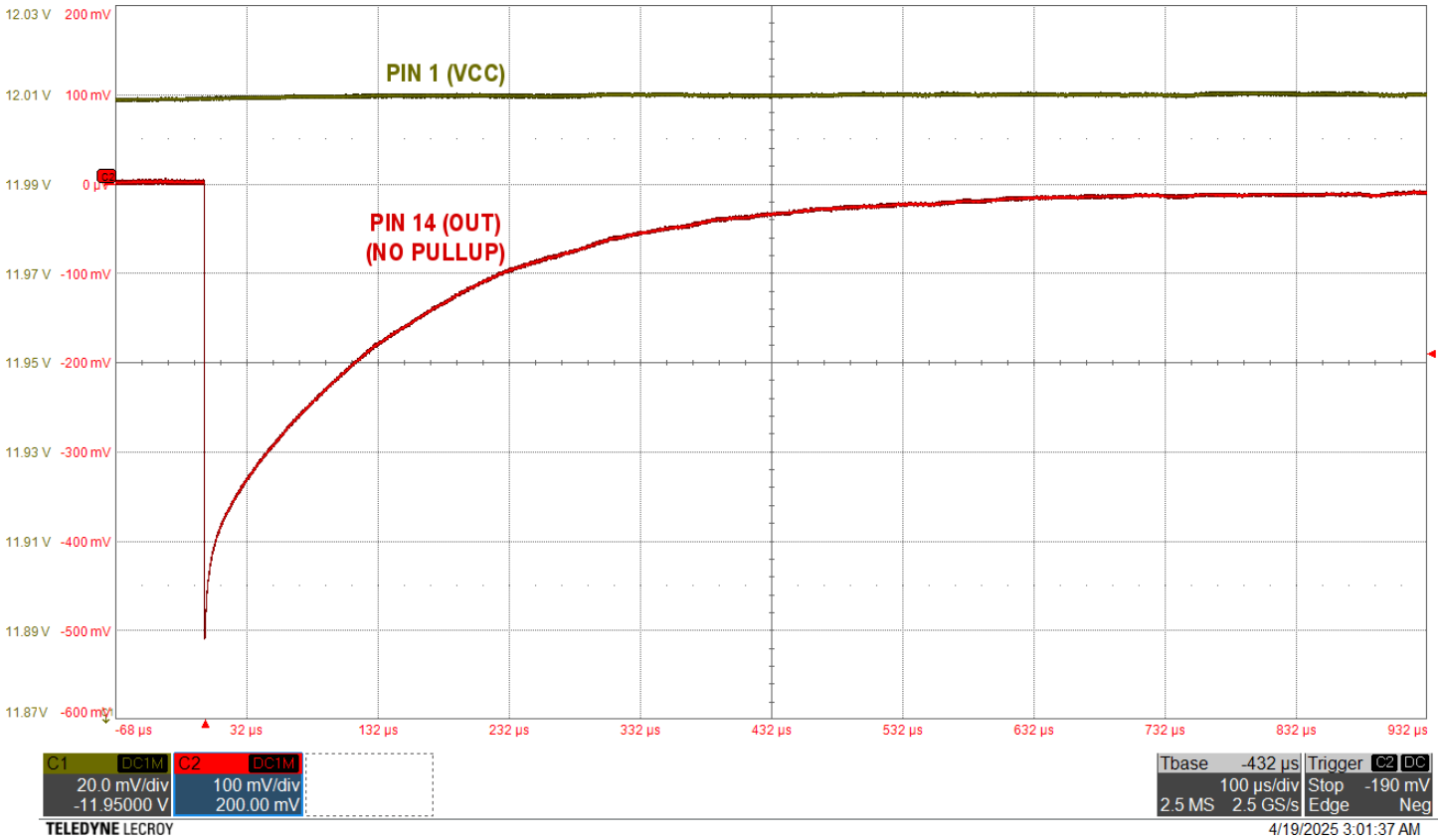


Scope 03_08: Zoom in of output switch point with 10 kΩ pullup. No negative pulse or even dip that would cause negative feedback.



Scope 03_09: Output switching without a pullup generates repetitive <0.5V negative pulses on the output pin. Each negative pulse lasts 100s of microseconds and exceeds the datasheet ab max rating for input voltage.

(This is pin 14. The divider for the previously unused static gates was changed to make pin 14 switch as C1 charges and discharges. R6 pullup removed.)



- end of part 3.