RMG PROGRAMMABLE LO

for

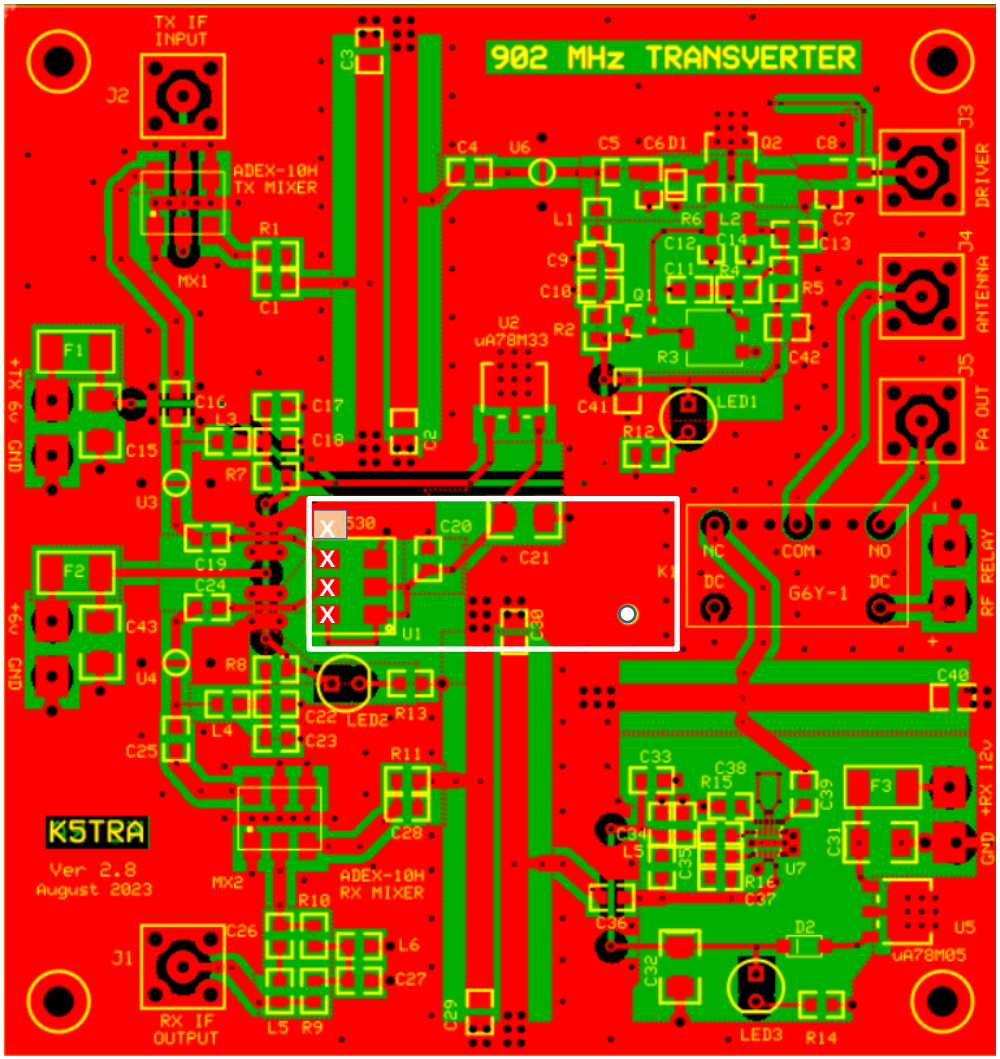
902 MHz TRANSVERTER

[and other transverters & beacons]

HOW IT WORKS

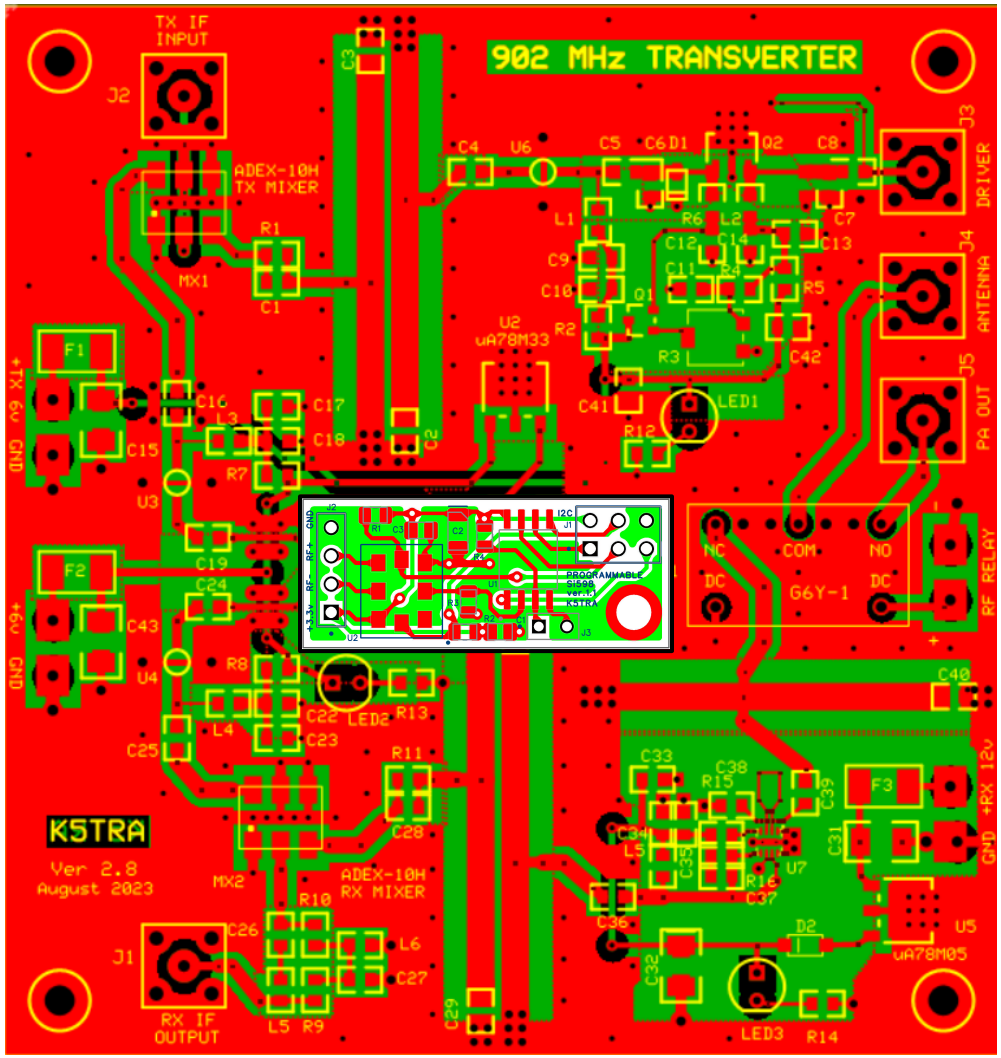
- Si598 programmable oscillator
- When powered, the Si598 must be programmed to the desired frequency.
- ATtiny85-20 microcontroller communicates via I2C with the Si598
- Set the frequency and then go to sleep
- A second frequency can be programmed and selected on control line.

LO BOARD CONTACTS & MOUNTING



- 4-PIN header below LO board contacts RF board
- Ground contact (top): remove (scrape) solder mask
- 4 PINs are soldered to pads on RF board
- Mounting hole to 4-40 standoff and screw through RF board

LO BOARD ON TRANSVERTER RF BOARD

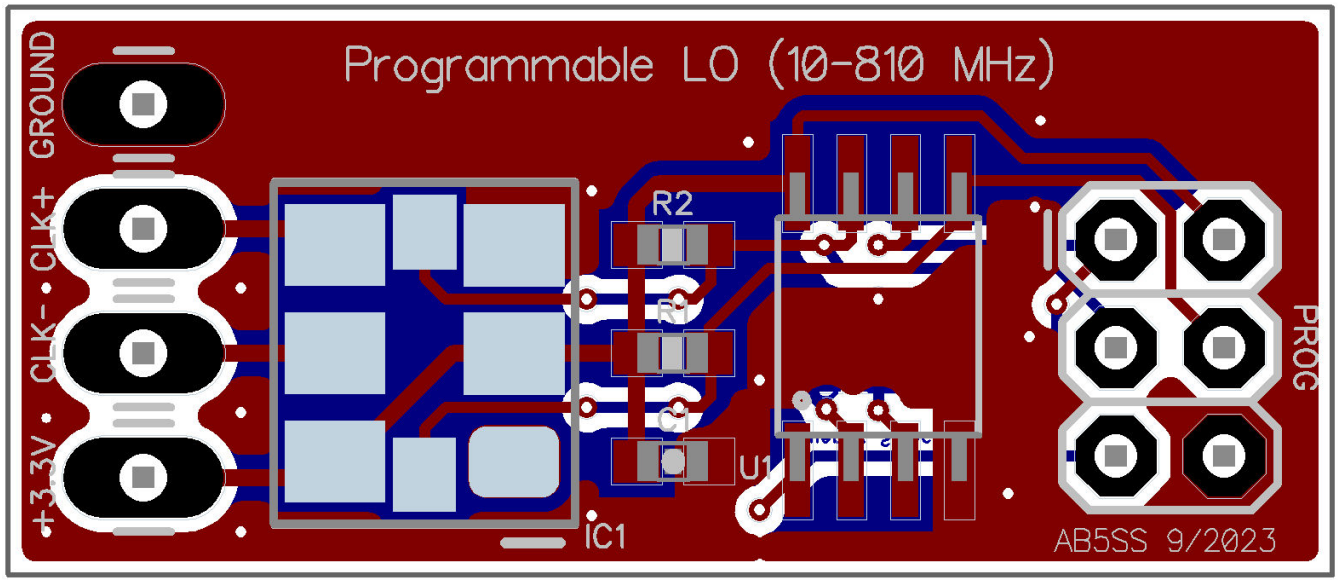


EVOLUTION OF THE LO BOARD

- John Maca (AB5SS) deserves huge props for the original idea of using an ATtiny85-20 MCU and a Si598 programmable LO for the 902 MHz RMG transverter, as an alternative to the factory programmed Si530.
- The original prototype board was done by John (using Eagle) and the original code to program it, in Arduino IDE.
- ATtiny85 MCU programming can be done with either Arduino IDE or Atmel/Microchip Studio.
- The AVR ISP MKII programmer can be setup to work with either IDE or Studio; not both on the same PC.
- Joe Haas (KE0FF) has written code for the Atmel (Microchip) Studio to program the ATtiny85-20 and Si598 circuit. Joe did an outstanding job.
- Tom Apel (K5TRA) has created two boards (using DipTrace). The same ports on the MCU were used for I2C lines to Si598 (SDA and SCL) as in John's prototype board; so, Joe's code in Studio will work with all of the boards. That code also controls the Si598 'Output-Enable' and provides for a second frequency.

AB5SS PROTOTYPE BOARD

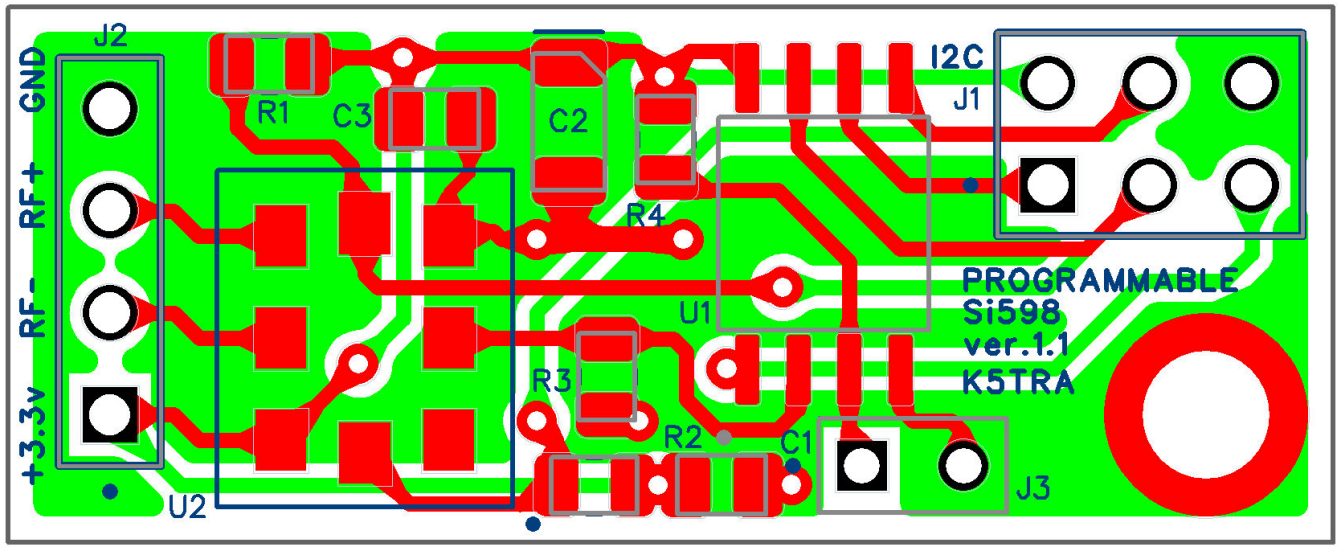
- Output pin pitch is 0.115”.
- One 0.1uF V+ bypass.
- Potential future control pads on backside of board.
- Bare-bones circuit.



(1.225" x0.525”)

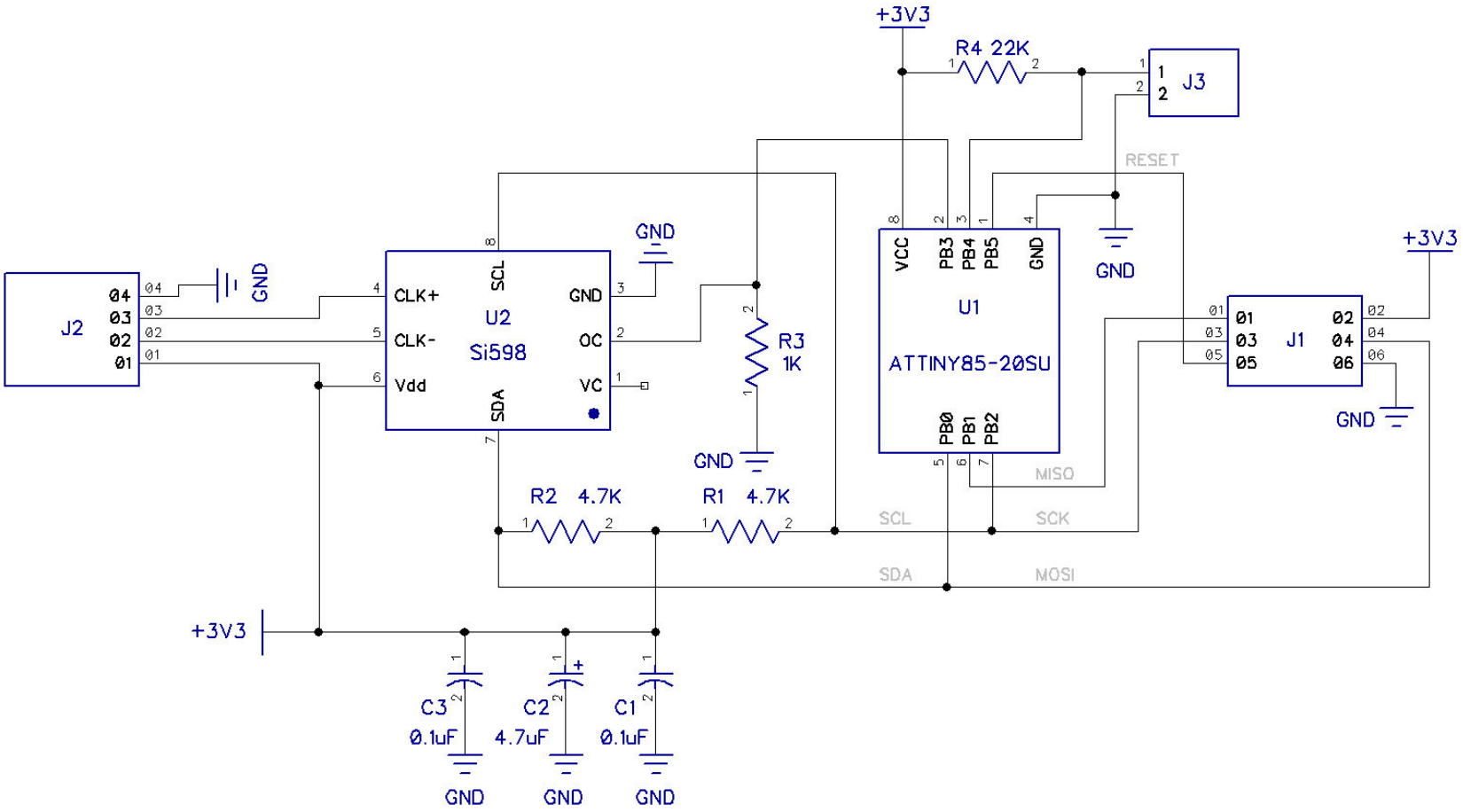
902 MHz TRANSVERTER LO DAUGHTER BOARD

- Output pin pitch matches the Si530 pad pitch (0.100”) with a 4-pin header attached to the bottom side of the board.
- Mounting hole for 4-40 screw to standoff (to transverter RF board).
- More bypass capacitance on V+.
- Si598 Output-Enable is also controlled by the MCU (PB3).
- A selectable second frequency is provided through PB4.



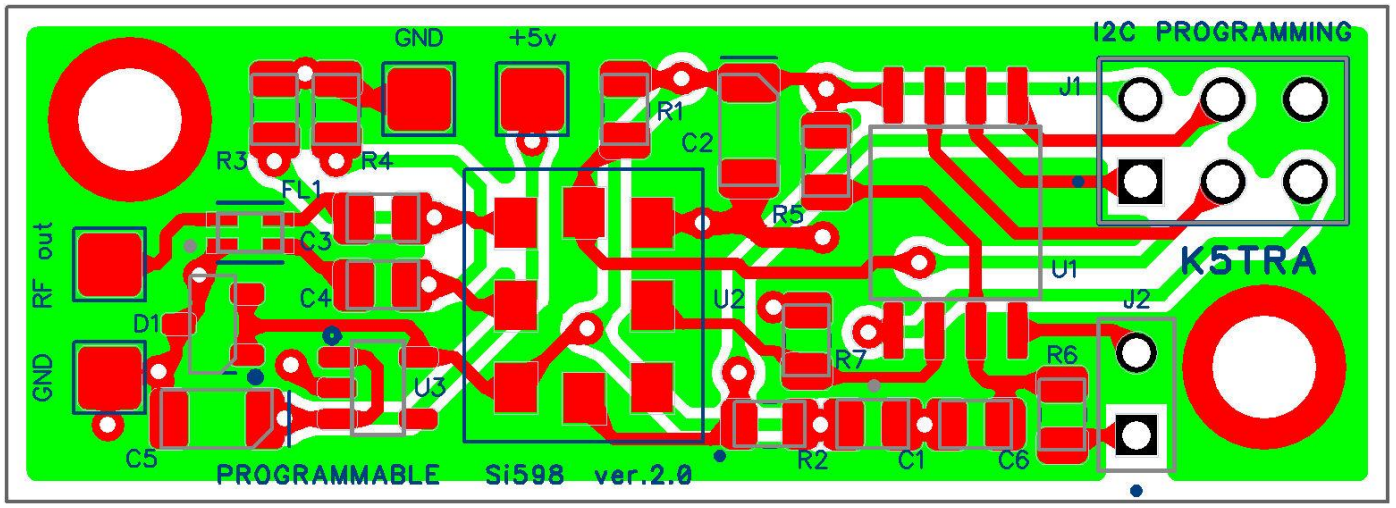
(1.300" x0.525”)

LO DAUGHTER BOARD SCHEMATIC



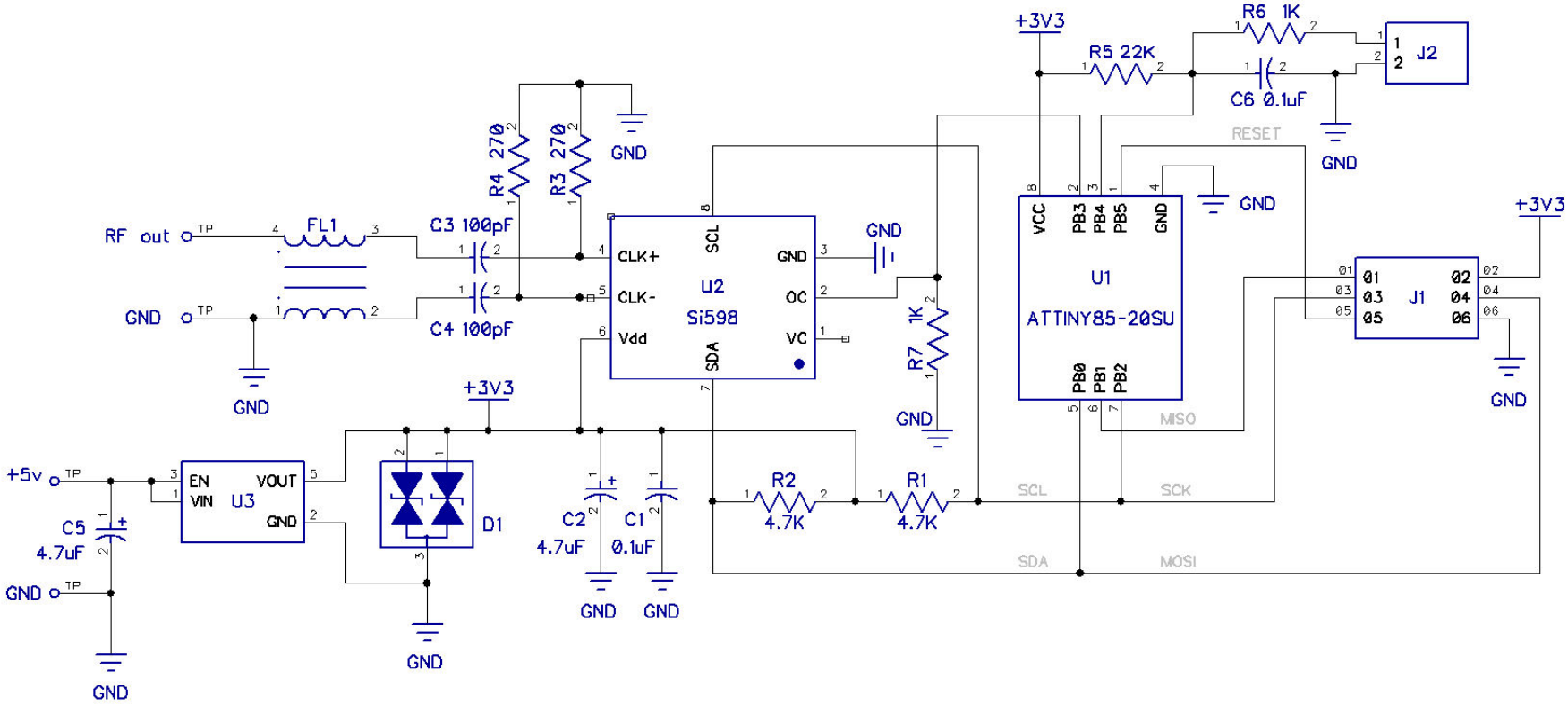
GENERAL PURPOSE 2-FREQUENCY BOARD

- Differential output is coupled to single-ended output with DC blocking capacitors and balun.
- Onboard LDO (and very quiet) 3.3v regulator. This will be low dissipation when powered from external +5v.
- ESD protection on +3.3v bus.
- Two mounting holes for 4-40 standoffs.
- Si598 Output-Enable is also controlled by MCU (PB3).
- A selectable second frequency provided through PB4. Additional RC filtering on control interface (2-pin header) to assist software de-bounce.

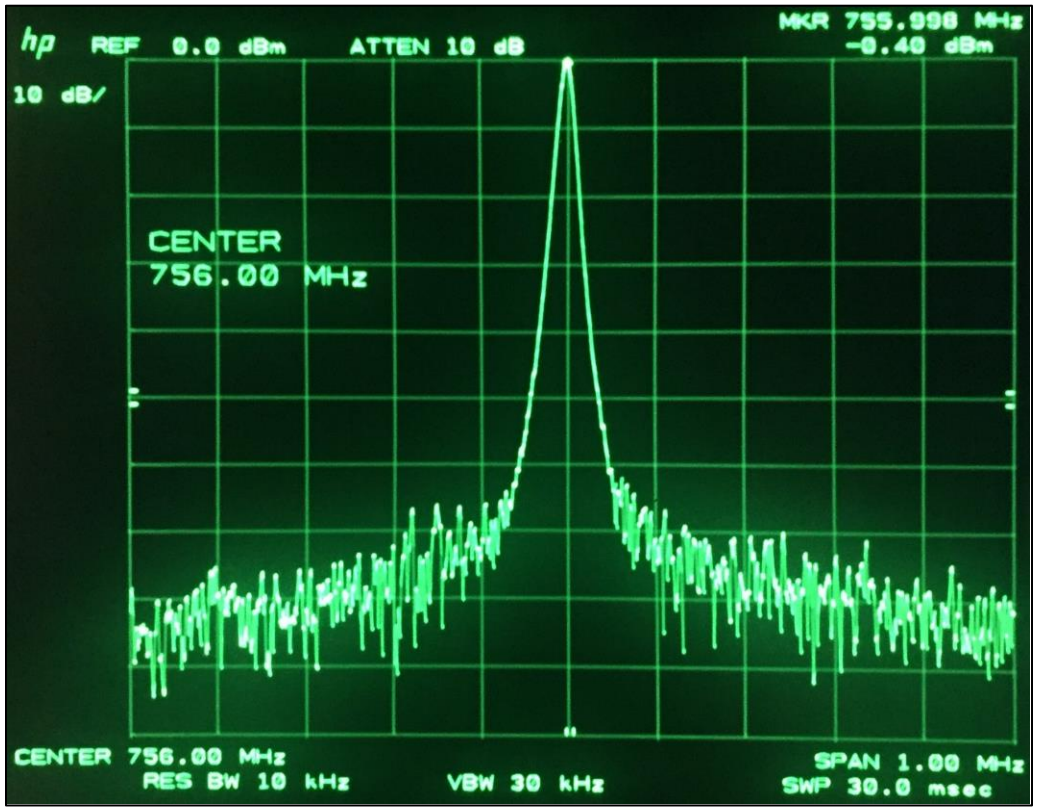


(1.675" x0.600")

GENERAL PURPOSE BOARD SCHEMATIC

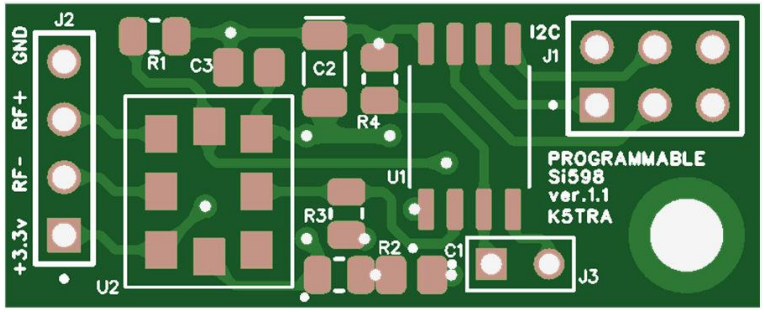


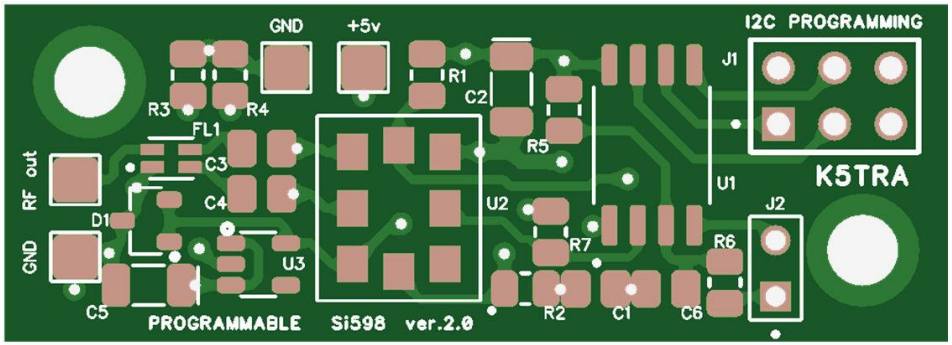
TEST BREADBOARD OUTPUT SPECTRUM



- Breadboard yields ~ 0 dBm single-ended output (each side of differential output)
- Programming can be “tweaked” to tune the frequency to very tight tolerance

QUESTO E' TUTTO





- Atmel/Microchip Studio programming: https://github.com/ke0ff/PgmXtal
- Arduino IDE programming: jjmaca@gmail.com
- Layout GERBER files: tom@k5tra.net