

EXCALIBUR

A compact card that sits on the Atlas bus, for the purpose of providing a more accurate 10MHz clock signal for the bus mounted HPSDR cards.

It can be configured/populated in one of two ways.

First, as a way to take an external 10MHz signal, such as a Sine wave output from a reference standard or GPS disciplined oscillator, into a BNC input and process it into a square wave and put it on Atlas bus line C16.

Alternately, as a way to have an on-card TCXO with more accuracy than the 10 MHz oscillators on either Penelope or Mercury, as an "instant-on" 10 MHz TCXO.

The board has a 10 MHz input BNC, and a 10 MHz "Output" BNC connector. The input can be configured to drive the bus, or act as a reference for setting the on-board TCXO. The Output is a way to lock external equipment to what ever 10 MHz source is in use.

There is a multi-colored LED, hooked to the output of a frequency-phase detector comparing the TCXO to whatever is coming in the input connector. It gives both a HIGH/LOW frequency color indication and a visible beat indicator. It is useful for setting the TCXO to within a fraction of a Hz.

The 10 MHz oscillators on the Mercury or Penelope cards have a rated stability of +/- 50 or 100 ppm over wide temperature, or +/- 500 Hz to 1 KHz at 10 MHz. Using the Calibrate function built into PowerSDR, you can set them to WWV or other reference, with an accuracy of about 10 to 30 Hz, but I would still expect them to walk around +/- 50 to 100 Hz over normal room temperature variation.

The (medium performance) TCXO on Excalibur has a rated stability of +/- 1 ppm over wide temperature, or +/- 10 Hz at 10 MHz. I observe that over just normal room temperature variation, it appears to stay within 1 Hz of the calibrated frequency, and likely age at the rate of 1 Hz every several months.

A (high performance) external 10 MHz GPS disciplined oscillator

will typically hold +/- 0.0002 ppm or +/- 0.002 Hz at 10 MHz for as long as the GPS satellites remain operating.

The card is the same width as Penelope or Mercury, but is only 4 cm. (1.6 inches) high, and takes one slot position on the Atlas bus. Since all parts are available at Mouser in single unit quantities, I would expect this to be offered as a bare board or basic parts kit. The only expensive part is the TXCO (about \$45), which is not necessary if you just want to inject a 10 MHz external reference.

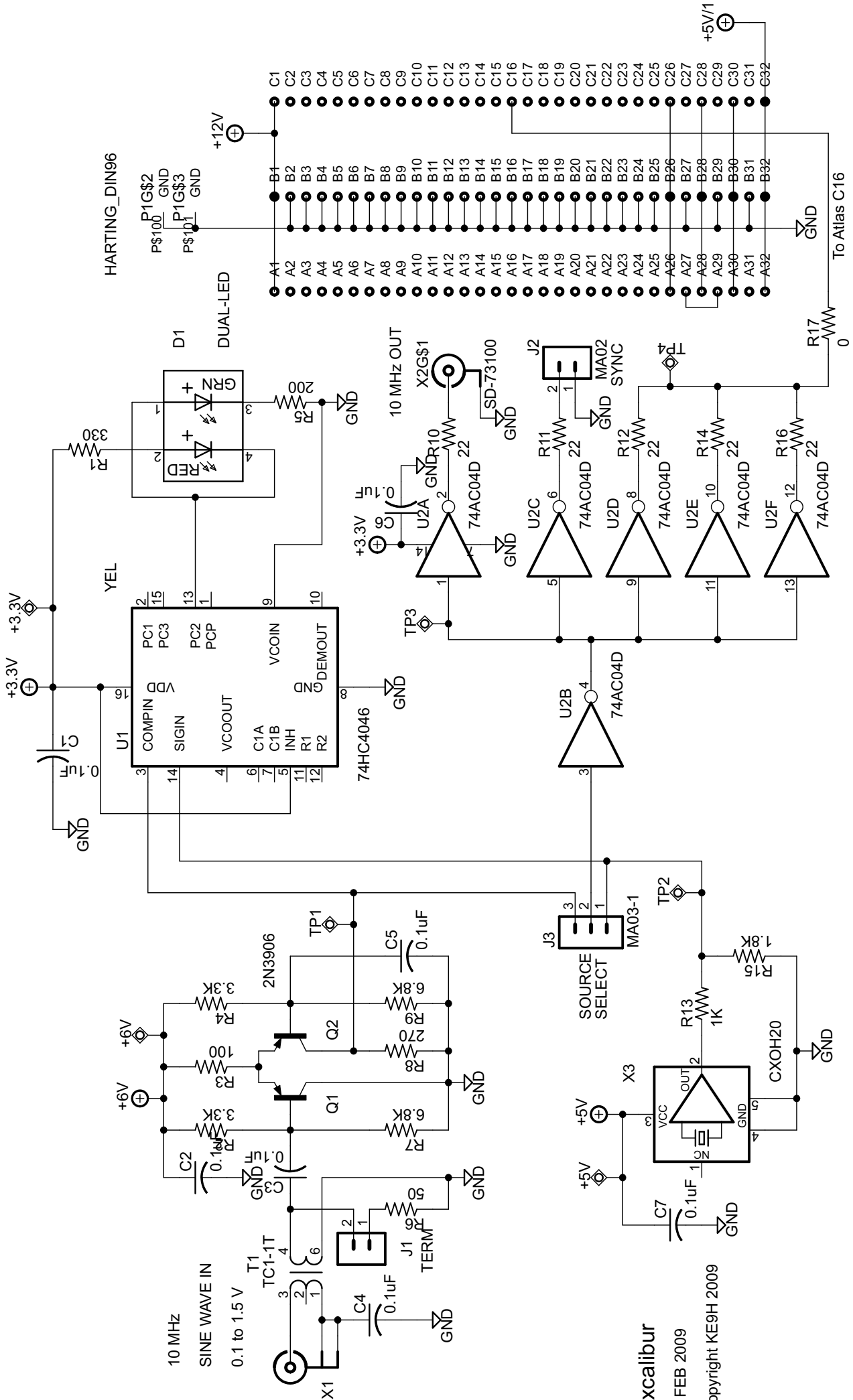
Although the board contains no software, it is compatible with the JTAG chain, so that it will pass through JTAG programming from cards on either side of it.

A breadboard version of this design is working, currently.

Please review and comment on the design.

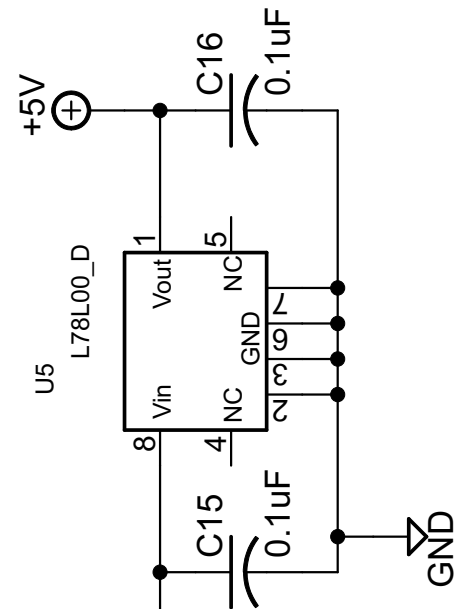
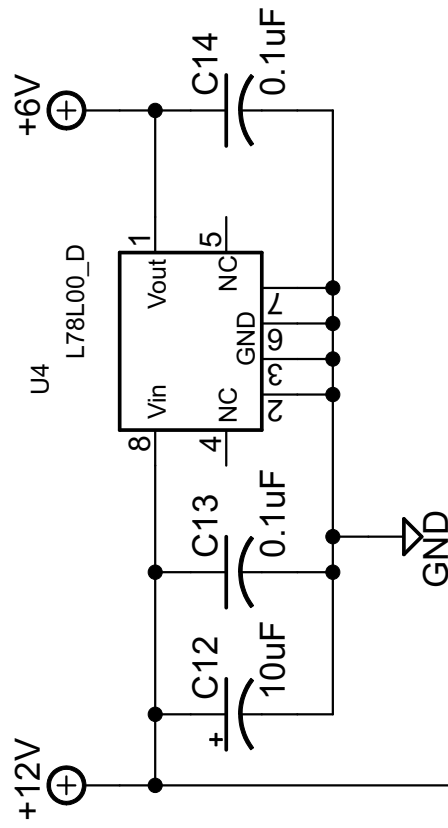
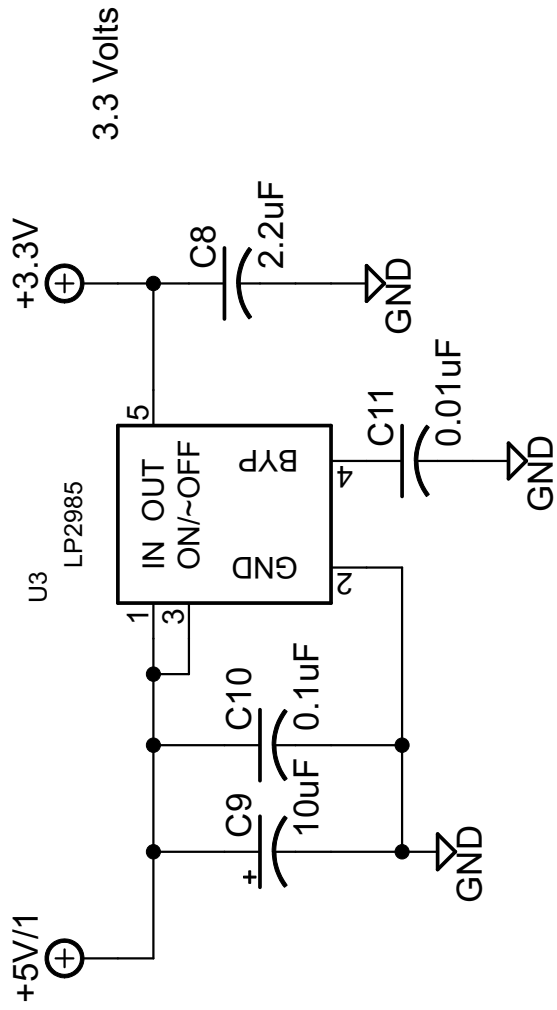
--- Graham / KE9H

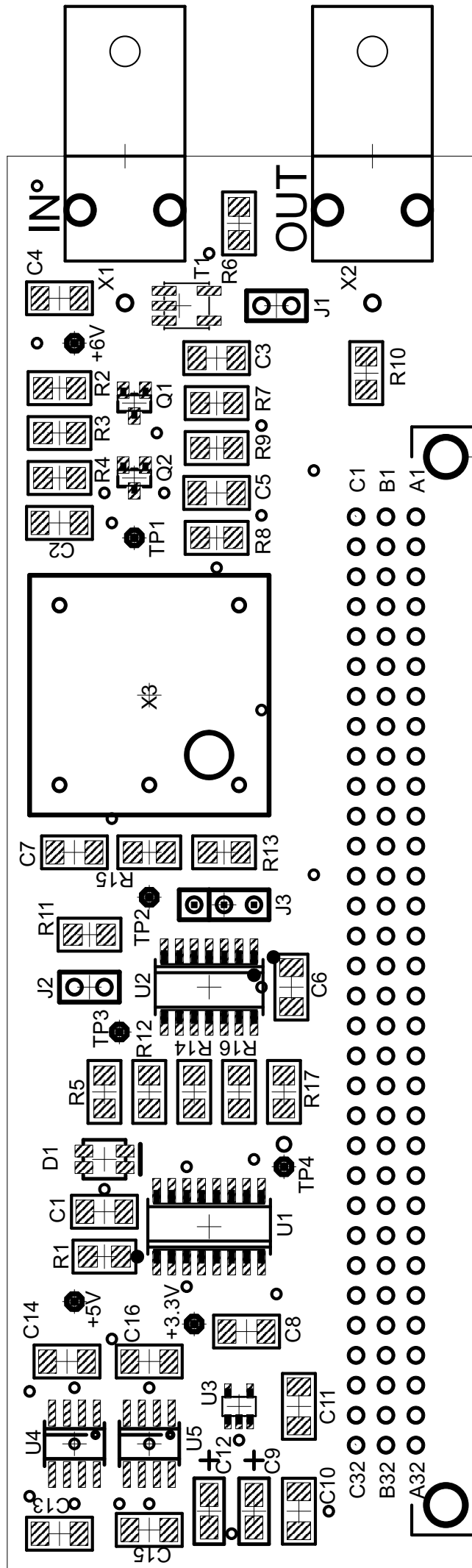
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Crystek Corporation

Part Number: CXOH20-BP-10.000

Temperature Compensated Crystal Oscillator TCXO

Applications

- Test Equipment
- RF Sources

Features

- High Stability
- Excellent Phase Noise
- AT-Cut Crystal
- Mechanical Trimmer

Frequency Options

- 10.000 MHz
- 16.000 MHz
- 20.000 MHz
- 25.000 MHz



FREQUENCY STABILITIES	MIN	TYP	MAX	UNITS	CONDITIONS
Frequency Overall Stability	-1.0		+1.0	PPM	-10° to +60°C (reference @ 25°C)
Frequency vs Input Voltage	-0.3		+0.3	PPM	for ±5.0% change in Vcc
Frequency vs Load	-0.3		+0.3	PPM	
Frequency vs 1 year aging	-1.0		+1.0	PPM	
Frequency adjustment range	±3.0			PPM	mechanical trim

Supply Voltage / Current	MIN	TYP	MAX	UNITS	CONDITIONS
Supply Voltage	+4.5	+5	+5.5	VDC	
Supply Current			20	mA	

HCMOS OUTPUT	MIN	TYP	MAX	UNITS	CONDITIONS
Signal Level (Voh)	4.5			VDC	
Signal Level (Vol)			0.5	VDC	
Duty Cycle	40		60	%	@ Vcc/2
Load		15		pF	

PN: CXOH20-BP-10.000 Rev. C

