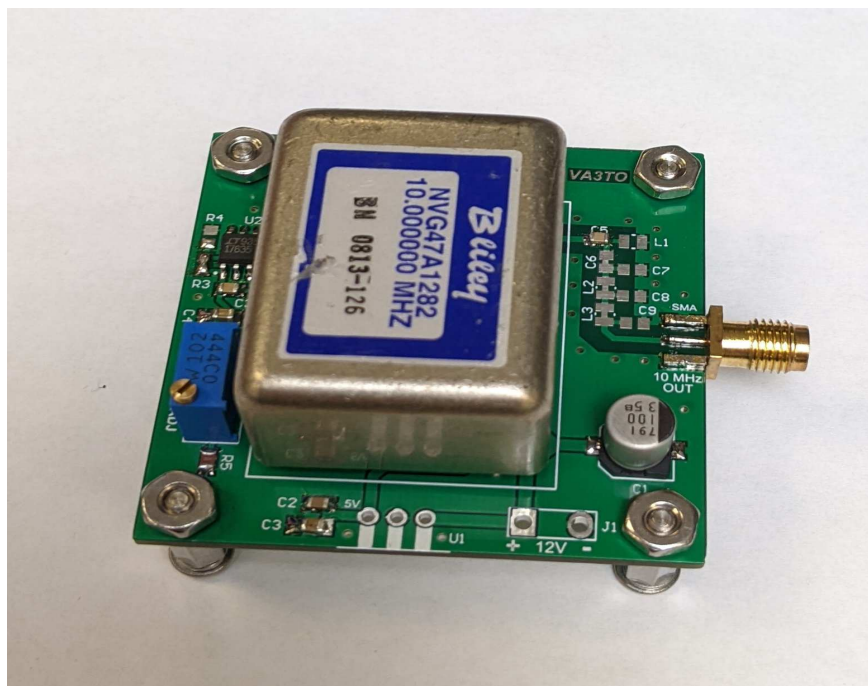


Bliley / CTI 10 MHz OCXO Board

*Hugh Duff VA3TO
Revision A May 2023*

This board was designed to provide the necessary supply voltages and frequency adjustment for Bliley NV(G)47A1282 or CTI OSC5A2B02 10 MHz OCXO modules. These modules were removed from decommissioned cell site equipment and have been available on eBay and other surplus sites for several years. They have proven to be very reliable and offer excellent frequency stability for microwave transverters and other equipment that has provision for an external 10 MHz reference.



FEATURES

- Board dimensions: 2" x 2", mostly SMD components.
- Actual OCXO Module operates at 5V so no worries about frequency instability when 12V battery voltage sags during portable operation.
- MIC29300 3A LDO regulator brings the input voltage (+12 ~ +20V) down to +5V. Also uses an LT1763CS8 low noise LDO regulator to supply the steering voltage for improved stability.
- Provision for a 10 MHz bandpass filter or attenuator.
- Current draw at startup ~600mA and settles to ~200mA after a 3 to 4 minute warmup period.
- Mounts using 4x 4-40 standoffs and screws + 1x 4-40 screw for the regulator.

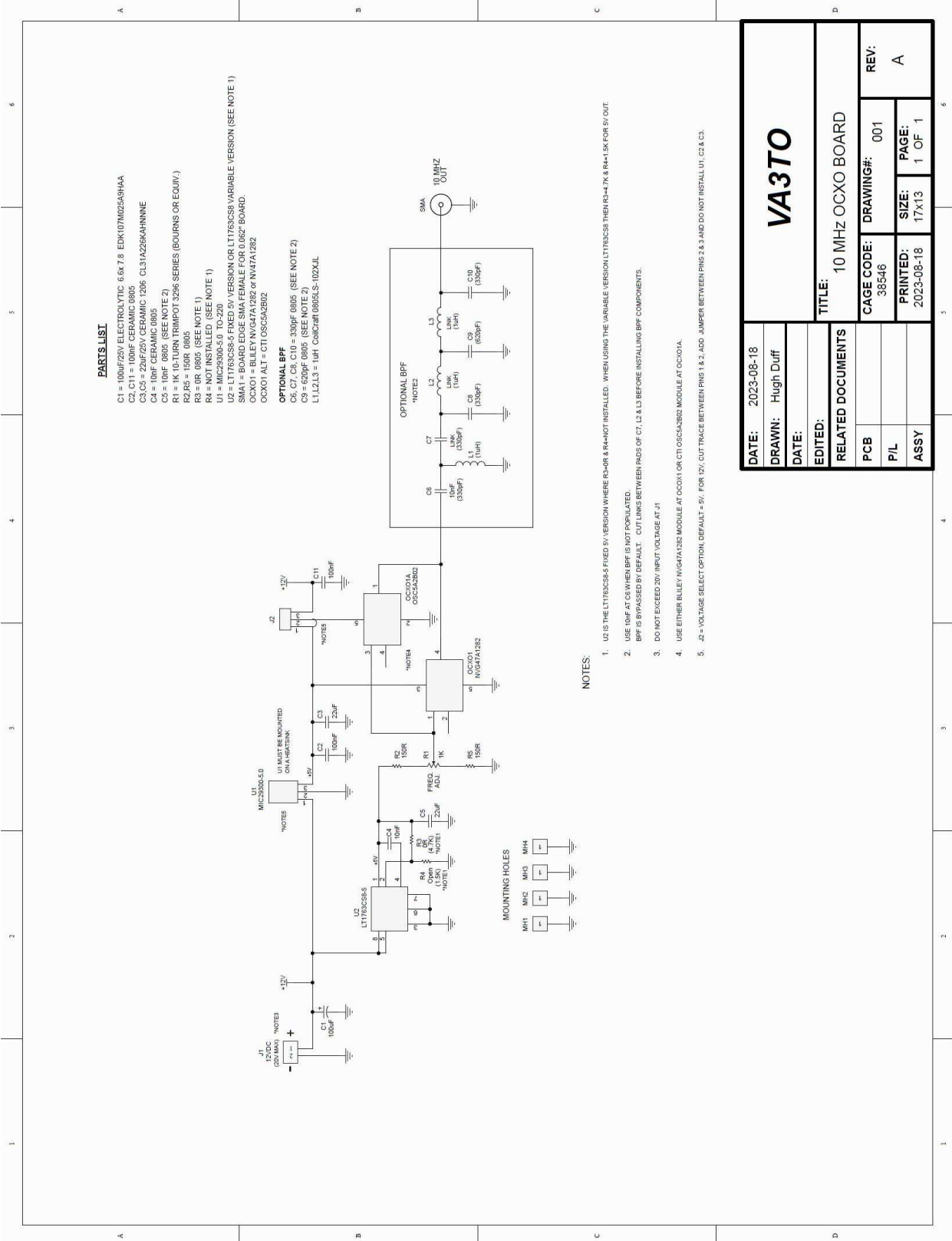
ASSEMBLY

1. Install all SMD resistors and capacitors.
2. Install U2 with pin 1 correctly oriented.
3. Install C1, R1 and the board edge SMA connector.
4. Install standoffs in all 4 corners of the board.
5. Install the MIC29300 regulator so that it can be fixed to a heatsink as it can get quite hot. The board can be mounted with the regulator installed vertically and leads bent so that the tab can be secured to a chassis wall or heatsink that is flush with the edge of the board, or with the regulator mounted horizontally with leads bent 90° up so that it can be heatsinked to a bottom mounting plate or chassis.
6. Install the OCXO module.
7. Apply 12 to 15VDC to the board. Measure the output of U1 and verify the voltage is around +5V. Also measure the output of U2 at the junction of R2, C4 & C5. This should also be around +5V. Remove power to the board.

ADJUSTMENT

1. Connect power to the board and allow the module to warm up for 10 to 15 minutes.
2. Connect the output at the SMA connector to a calibrated frequency counter or spectrum analyzer.
3. Adjust R1 to net the frequency as close to 10.000000 MHz as possible. Let it sit powered up for 1 hour and readjust the frequency.
Remove power to the board and allow the module to cool to room temperature.
Repeat the above steps and adjust as necessary.
Disconnect from test setup, install into equipment and enjoy accurate & stable operation.

SCHEMATIC



DATE: 2023-08-18		<h1 style="margin: 0;">VA3TO</h1>	
DRAWN: Hugh Duff			
EDITED:			
RELATED DOCUMENTS			
PCB	CAGE CODE: 38546	DRAWING#: 001	REV: A
P/L		PRINTED: 2023-08-18	PAGE: 1 OF 1
ASSY		SIZE: 17X13	
TITLE: 10 MHz OCXO BOARD			

BLILEY P/N: NVG47A1282
MODULE SPECIFICATIONS

Frequency: 10.0 MHz

Output:

Sinewave

Level: +7 dBm Min 1 dB (Over -30°C to +70°C and $V_s = +5.0 \pm 3\%$)

Load: 50 Ohms

Harmonics/Subs: -30 dBc Max

Spurious: -80 dBc Max

Frequency Stability:

Temperature: 0.005 ppm over -5°C to +50°C, 0.020 ppm over -30°C to +70°C

Aging: 1.0 ppb/day, 0.3 ppm/year

Supply: 1.0 ppb for a 1% change

Electrical Frequency Adjust:

Range: 0.5 ppm Min to 1.1 ppm Max

Sensitivity: 2.5 Hz/V Min to 5.5 Hz/V Max

Voltage: +0.0 Vdc to +4.0 Vdc

Slope: Positive

Input Impedance: 10 Kohms to 100 Kohms

Start-Up:

10 MHz output level within 0.5 seconds over -30°C to +70°C

Short Term Stability: 1×10^{-10} for 0.1 sec to 1 sec

Phase Noise:

-120 dBc/Hz at 10 Hz

-130 dBc/Hz at 100 Hz

-140 dBc/Hz at 1 KHz

-145 dBc/Hz at 10 KHz

-145 dBc/Hz at 100 KHz

Warm-Up:

Within 1.0 ppm in 2 Minutes

Within 0.1 ppm in 2.5 Minutes

Within 0.03 ppm in 5 Minutes

Within 0.01 ppm in 15 Minutes

Supply:

+5.0 Vdc $\pm 5\%$

5 Watts Max at Warm-Up

2 Watts Max Steady state at +25°C

Vref: +4.0 Vdc 0.2 Vdc at 1 mA Max

Operating Temperature Range:

Normal: -5°C to +50°C

Extended: -30°C to +70°C

CTI P/N: OSC5A2B02
MODULE SPECIFICATIONS

Frequency: 10.0 MHz

Output:

Squarewave (HCMOS)

Level: Voh >4.5V, Vol <0.5V

Load: 15pF

Duty Cycle: 45 ~ 55%

Frequency Stability:

< +/- 10ppb (@ +25°C)

Aging < 0.5 ppb/day

< 100 ppb/1st year

< 0.4 ppb/ 10 years

Electrical Frequency Adjust:

Range: 0 Vdc to +4.0 Vdc

Slope: Positive

Input Impedance: > 100 Kohms

Warm-Up:

+/- 100 ppb within 5 Minutes (VC = 2.0V @ 25°C)

Short Term Stability:

< 0.05 ppb/s after 1 hour

Phase Noise:

-80 dBc/Hz at 1 Hz

-120 dBc/Hz at 10 Hz

-140 dBc/Hz at 100 Hz

-145 dBc/Hz at 1 KHz

-150 dBc/Hz at 10 KHz

Supply:

+5.0 Vdc 5%

< 600mA at start-up

< 250mA stable

Operating Temperature Range:

Normal: 0°C to +75°C

Extended: -40°C to +85°C