About Your 6608 Device

This note describes the 10 MHz high-stability, oven-controlled crystal oscillator (OCXO) on your 6608 device. The 6608 devices are a functional superset of the 6602 devices, so all of the features and functionality of the 6602 devices, described in the *6601/6602 User Manual*, also apply to your 6608 device.

High-Stability, Oven-Controlled Crystal Oscillator (OCXO)

Your 6608 device includes a 10 MHz OCXO. See the *6608 Specifications* section of this document for details on the OCXO characteristics. You can route this 10 MHz clock to any of the RTSI lines or PXI Triggers. The relationship and mapping between the RTSI lines and PXI Triggers is described in Table 1-1 of the *6601/6602 User Manual*. The RTSI lines are available to each counter as GATE or SOURCE.

- **PXI-6608**

  Each PXI chassis has a built-in 10 MHz system reference clock source that is independently routed to each peripheral slot. An independent buffer on the chassis drives the clock signal to each peripheral slot with a skew of less than 1 ns between slots. You can use this common reference clock signal to synchronize multiple modules in a measurement or control system.

Note For 6602 and 6608 devices, the maximum timebase is phase locked to the PXI backplane clock.

If desired, you can use the 10 MHz clock from the OCXO on the PXI-6608 to drive the 10 MHz PXI backplane clock. Doing so improves the stability of clocks in modules that are phase locked to the PXI backplane clock. To use the PXI-6608 10 MHz clock as the PXI backplane clock, install the device in slot 2 of the PXI chassis and enable PXI Star on the PXI-6608. When the PXI chassis senses a clock on PXI Star in slot 2, the chassis disables its internal clock and uses the clock from the PXI-6608 instead. If you plug in a PXI-6608 board in a *non*-Star Trigger slot, the board's clock cannot replace the PXI backplane clock.

Note When a PXI-6608 is installed in slot 2 of a PXI chassis, by default the 10 MHz clock from the PXI-6608 OCXO is driven onto PXI Star so that the board's clock is used as the PXI backplane clock. If PXI Star is disabled on the module in slot 2 of a PXI chassis, the PXI chassis internal 10 MHz clock is used as the PXI backplane clock.

Figure 1 illustrates how the 10 MHz clock from the OCXO is used as the PXI backplane clock.

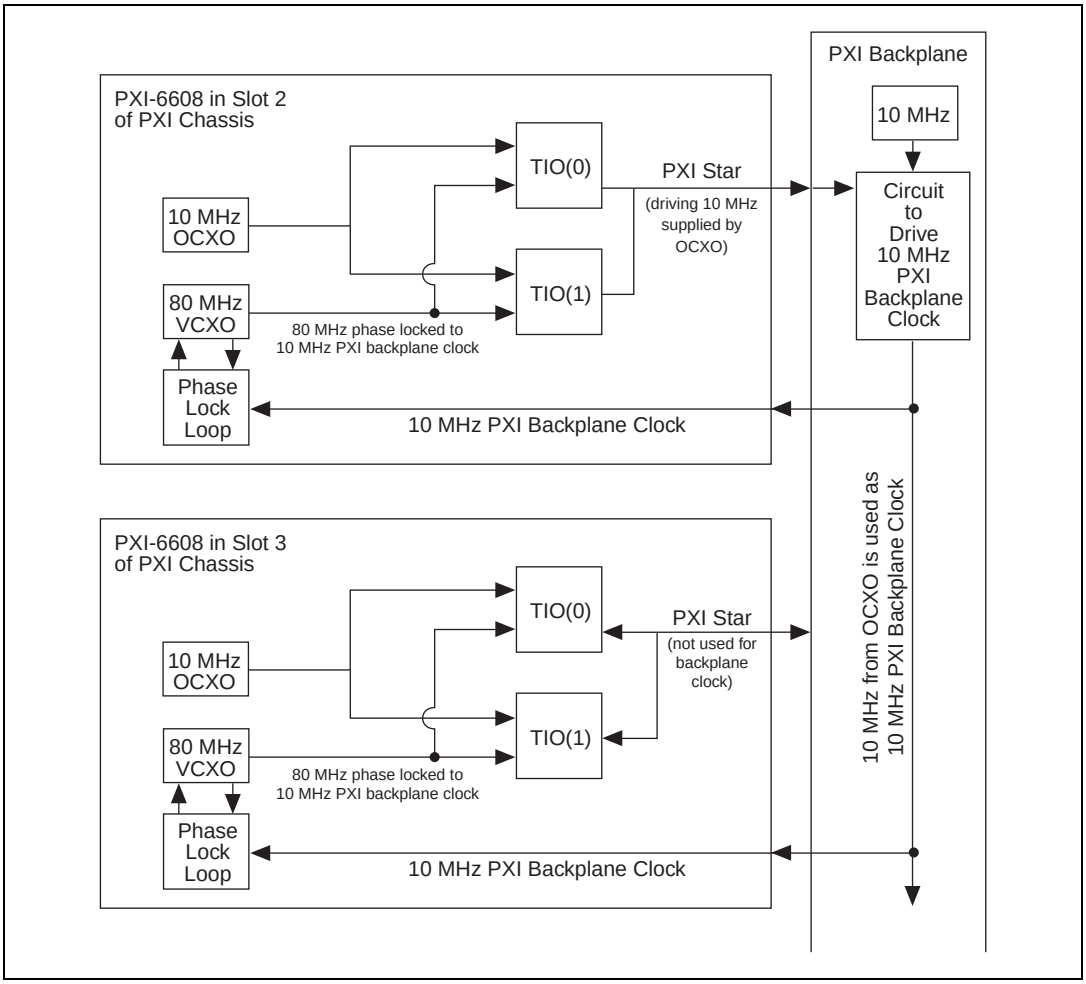

Figure 1. Using the PXI-6608 OCXO as the 10 MHz PXI Backplane Clock

OCXO Frequency Deviation

The OCXO on your 6608 device is calibrated prior to shipment to within 0.1 Hz of 10.000000 MHz. Calibration details are given on the calibration certificate that accompanies each 6608 device.

Each time the OCXO is powered on, it requires some amount of time to reach its calibrated frequency. The amount of time required is proportional to the amount of time the OCXO was powered off prior to being powered back on. The amount of time required for the OCXO to reach its calibrated frequency for different power-off durations is shown in Table 1.

Table 1. Required Power-On Duration to Reach Calibrated Frequency

OCXO Power-Off Duration (Days)	Required Power-On Duration to Reach Calibrated Frequency (Days)
0 to 5	3
6 to 10	4
11 to 20	5
21 to 40	6
41 to 90	7
Over 90 days	8

The maximum frequency deviation after an extended power-off period (90 days or more) is within 0.135 ppm of the calibrated frequency. This value includes effects of aging, temperature, and supply voltage. Therefore, in all cases of power-off periods, maximum frequency deviation is within 0.135 ppm of the calibrated frequency when it is powered on. Once the OCXO is powered on again, it returns to its calibrated frequency within the time shown in Table 1. For power-off periods of less than one hour, the OCXO will be within 0.01 ppm of its final frequency in 3 minutes.

The dominant source of frequency drift of the OCXO is aging. The OCXO ages in a nonlinear manner, and most of the aging occurs in the first few days of operation. The aging of the OCXO on a 6608 device is within 0.1 ppm over one year. The approximate frequency deviation due to aging is shown in Table 2. If needed, the 6608 can be recalibrated to correct for aging. For recalibration, refer to the *6608 Calibration Procedure* available at `www.ni.com/support/calibrat`.

Table 2. Frequency Deviation Caused by Aging

Aging in Days	Frequency Deviation Caused by Aging (ppm)
10	0.025
60	0.05
200	0.075
365	0.1

Note In order to calibrate your device, you need an external clock with a short-term stability (over a period of 100 seconds) of better than 5×10^{-11}. Using a clock that does not have the required frequency stability will cause improper calibration of the high stability clock. A typical rubidium time standard will meet the required stability.

6608 Specifications

Specifications for the 6602 devices in the *6601/6602 User Manual* also apply to the 6608 devices with the following modifications. In the OCXO specifications below, ppm denotes parts per million (1 ppm = 0.0001%).

Power

Device requirement..... +5 VDC (±5%)
1–2.5 A (with 1 m shielded cable as load) varies with application and OCXO warm-up period, does not include I/O power supplied through I/O connector

Available at I/O connector.....4.65 to 5.25 VDC, 1 A (maximum)

OCXO Specification

Frequency .....10.000000 MHz

Warm-up time (to within 0.01 ppm of operating frequency, power-off duration < 1 hour) .....3 minutes

Frequency stability versus supply voltage change (±5%) .....± 0.005 ppm

Temperature stability (0 to 50 ºC) .....± 0.005 ppm, reference to 25 ºC

Aging .....± 0.001 ppm/day
± 0.1 ppm/year

Allowed frequency adjustment (to correct for aging).....± 1 ppm, typical

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