

40 and 20 MHz Arbitrary Function Generators

NI 5406, NI 5402

- Phase-continuous frequency hopping and frequency sweeps
- 400 MS/s effective sample rate with interpolation
- .355 μ Hz frequency resolution
- $<\pm 0.4$ dB passband flatness across bandwidth for sine waveforms
- NI-TClk technology for timing and synchronization
- Built-in sine, square, triangle, noise ramp up, ramp down, and DC offset functions
- 32 kB memory for arbitrary waveform generation
- 10 V_{pp} into 50 Ω
- Low-jitter square wave and SYNC (TTL) output

NI 5406

- 40 MHz sine and square wave generation
- 5 MHz ramp and triangle wave generation
- 16-bit resolution

NI 5402

- 20 MHz sine and square wave generation
- 1 MHz ramp and triangle wave generation
- 14-bit resolution

Operating Systems

- Windows XP/2000
- LabVIEW Real-Time

Recommended Software

- LabVIEW
- LabWindows™/CVI
- Measurement Studio
- LabVIEW SignalExpress

Other Compatible Software

- Visual Basic
- ANSI C/C++

Driver Software (included)

- NI-FGEN
- FGEN Soft Front Panel

Calibration Certificate Available



Overview

NI 5406 and NI 5402 devices are 100 MS/s, 40 and 20 MHz arbitrary function generators (AFGs) that feature up to 16 bits of resolution and 32 kB of onboard memory for arbitrary function generation in a compact, 1-slot 3U PXI module or PCI board. Using these devices, you can combine the power of a stand-alone function generator with the flexibility and benefits of your computer to create highly capable virtual instrumentation solutions. Direct digital synthesis (DDS) is used to precisely generate waveforms that are repetitive in nature, including sine, square, triangle, ramp, noise, and DC waveforms.

Analog Output Performance

These devices feature unparalleled analog output performance in PXI and PCI. The analog output path features a 7-pole elliptical analog filter to suppress high-frequency signal images. Depending on your signal and application needs, you can select up to a 4X digital interpolation for an effective sampling rate up to 400 MS/s. Additionally, the analog output has a passband flatness of ± 0.4 dB across the bandwidth for sine generation.

Frequency Hops and Sweeps

The function generator uses DDS, which is a technique for deriving, under digital control, an analog frequency source from a single reference clock frequency. This technique is used to achieve high-frequency accuracy and resolution; temperature stability; and rapid, phase-continuous frequency switching. All frequency sweeping and hopping is phase-continuous, and you can generate a burst of several tones. Frequency sweeping and hopping is implemented through a frequency list of steps, each of which defines frequency and duration. Complex frequency lists can be instructed with 32 MS/s of available instruction memory.

Timing and Synchronization

Using NI-TClk synchronization technology, you can synchronize multiple NI signal generators for applications requiring a greater number of channels. Because it is built into the Synchronization and Memory Core (SMC), NI-TClk can synchronize NI signal generators with SMC-based high-speed digitizers and digital waveform generator/analyzers for tight correlation of analog and digital stimulus and response. Using onboard calibration measurements and compensation, NI-TClk can



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automatically synchronize any combination of SMC-based modules with less than 500 ps_{rms} module-to-module skew. Greatly improved from traditional synchronization methods, the skew between modules does not increase as the number of modules increases. To achieve even better performance, you can use a high-bandwidth oscilloscope to precisely measure the module-to-module skew. Using the oscilloscope measurement for calibration information, NI-TCIk can achieve <-20 ps_{rms} module-to-module skew.

Calibration

Every NI 5406 and NI 5402 device is factory calibrated using NIST-traceable standards. NI 5406 and NI 5402 devices have onboard calibration references that correct for environmental effects on DC gain, offset, and timing errors. If you want to calibrate your device externally, return your NI 5406 or NI 5402 devices to National Instruments or ship them to a qualified metrology lab for recalibration.

Software

Every National Instruments signal generator comes with the IVI-compliant NI-FGEN driver, which is fully compatible with NI LabVIEW, LabWindows/CVI, LabVIEW SignalExpress, and Measurement Studio, as well as Microsoft Visual C++ and Visual Basic. NI-FGEN also includes the interactive FGEN Soft Front Panel, with which you can quickly generate standard signals such as sine, square, and ramp, as well as user-defined waveforms. You can generate waveforms with control of frequency, amplitude, and DC offset as well as phase-continuous frequency hopping and sweeping. Simulation mode is available in both the FGEN Soft Front Panel and the NI-FGEN instrument driver, so you can develop your application without having the hardware in your system. In this mode, several developers can write applications for the same hardware and share resources.

Ordering Information

NI PCI-5406.....	779658-01
NI PCI-5402.....	779656-01
NI PXI-5406.....	779657-01
NI PXI-5402.....	779655-01

Includes the NI 540x hardware, NI-FGEN, and FGEN Soft Front Panel. Calibration certificate available.

Recommended PXI Switch

NI PXI-2593.....	778793-01
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For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to ni.com/modularinstruments.

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Calibration Services

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