64 MS/s, 14-Bit Frequency-Domain Digitizer

NI PXI-5620

- 1 analog input channel, 14-bit resolution
- 80 dB spurious-free dynamic range
- 1 kS/s to 64 MS/s sampling rate
- 10 kHz to 36 MHz (-3 dB bandwidth)
- AC coupled, 50 input
- 16 or 32 million sample acquisition

Operating Systems
- Windows 2000/NT/XP

Recommended Software
- LabVIEW
- LabWindows/CVI
- Measurement Studio

Application Software (included)
- Spectral Measurements Toolkit

Driver Software (included)
- NI-SCOPE

Calibration Certificate Included

See page 21.

Product	Bus	Analog Channels	Resolution	Sampling Rate	Spurious-Free Dynamic Range	Onboard Memory	Bandwidth
PXI-5620	PXI	1	14 Bits	1 kS/s to 64 MS/s	80 dB	32 or 64 MB	10 kHz to 36 MHz

Table 1. PXI-5620 Channel, Speed, and Resolution Specifications

Overview

The National Instruments PXI-5620 is a single-channel PXI digitizer for a broad range of applications in research, product design and validation, and manufacturing test. Its dynamic range and resolution make it ideal for all types of frequency-domain analysis. It is well suited for applications ranging from ultrasound and high-resolution ATE to broadband communications test, such as cable, DSL, and wireless test.

Because the NI PXI-5620 is based on the PXI platform, it can be integrated with other PXI hardware from National Instruments and other PXI vendors. For example, it can be uses with the NI PXI-5421 arbitrary waveform generator to create a stimulus/response test system for popular applications such as xDSL or baseband I/Q.

Hardware

Analog Input

The PXI-5620 provides outstanding dynamic range and resolution for measurements over a broad range of input levels. Its frequency range spans 10 kHz to 36 MHz, covering the intermediate frequency (IF) and high frequency (HF) bands for applications such as military and commercial radio, surveillance, and video. For superior distortion-free performance, you can use the dither capability of the PXI-5620 to achieve greater than 80 dB of spurious-free dynamic range in the 5 to 25 MHz band.

Acquisition Memory

The PXI-5620 is available with 32 or 64 MB of high-speed onboard memory, you can acquire up to 32 million real 16-bit samples, or 16 million complex 16-bit samples. The PXI-5620 uses the bus master capability of the NI MITE ASIC to move data to computer memory at much higher speeds – up to 10 times faster – than traditional instrument interfaces. This ASIC performs memory management functions usually handled by the system processor, so the host CPU resources can be devoted entirely to data processing and analysis, further improving measurement throughout.

Clock Generation

The sample clock of the PXI-5620 can synchronize to two sources – an external 10 MHz clock source or the PXI backplane – or it can run independently. Using the PXI backplane, the clocks of two or more PXI-5620 digitizers or other PXI modules can be synchronized without cables. This feature is useful for integrated test applications such as DSL parametric analysis, where signal generation and other test capabilities are required. Furthermore, the PXI-5620 has a front-panel connector that can synchronize to an external source.

Digital Downconversion and Decimation

With the digital downconversion (DDC) functionality of the PXI-5620, you can acquire narrowband signals at much less than the full digitization rate. By downconverting channels up to 1.25 MHz to baseband, the PXI-5620 dramatically reduces the

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Applications
General Purpose
Spectral Analysis for R & D
High-resolution ATE
Ultrasound/radar/lidar
Mass spectroscopy
High-energy physics
Military/aerospace
Surveillance
SigInt
Communications Signal Analysis
Cable modem test
xDSL test
Wireless test
AM and HF Radio Signals
Commercial military
Marine
Shortwave
IF and baseband analysis

sampling rate necessary to acquire these signals, resulting in dramatic throughput improvements. For example, if you want to acquire a signal with a 200 kHz bandwidth centered at 25 MHz, the rate at which samples can be stored can be as low as 250 kS/s.

Triggering

The PXI-5620 can import and export triggers from the PXI trigger bus, the PXI star trigger line, or the front panel SMB connector. The PXI-5620 can also take advantage of the PXI trigger bus to synchronize multiple devices for applications such as I/Q measurement in digital communications test.

Calibration

NI calibrates the amplitude accuracy of the PXI-5620 analog input channel. Temperature variations are calibrated and corrected during normal operation resulting in very high stability and repeatability. The PXI-5620 is shipped with NIST-traceable and ISO-9002-certified calibration certificate.

Measurements
Zoom FFT
Zoom power spectrum
Averaged power spectrum
Averaged cross spectrum
Averaged frequency response
Amplitude calibration
Power spectral density
Peak frequency
Peak amplitude/power
Spectrum peak search
Power in band
Adjacent channel power
Occupied bandwidth
Demodulate AM
Demodulate FM
Demodulate PM
Downconvert passband

Software

The National Instruments Spectral Measurements Toolkit and NI-SCOPE software are included with the PXI-5620. The Spectral Measurements Toolkit plugs directly into LabVIEW and LabWindows/CVI to offer high-level measurement functionality. For a complete list of functions, refer to Table 3. NI-SCOPE provides a driver-level interface and integrates with NI LabVIEW, LabWindows/CVI, and Measurement Studio.

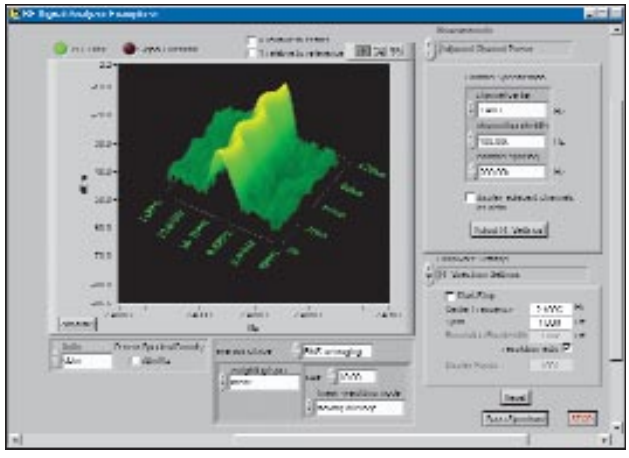

Figure 1. Spectral Measurements Toolset 3D Spectrum Screen

Ordering Information

NI PXI-5620
32 MB 778282-01
64 MB 778282-02
Includes PXI-5620 module, NI-SCOPE driver software, and Spectral Measurements Toolkit.

BUY ONLINE!
*Visit **ni.com/products** and enter pxi5620.*

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Specifications

Valid over specified operating environment (0 to 50 °C) unless otherwise stated.

General

Input channels	1
Resolution	14 bits
Sampling rate range	1 kS/s to 64 MS/s
Onboard memory	16 or 32 MS
Using DDC (complex data)	8 or 16 MS

Input

Signal level	
Nominal	0 dBm (± 0.316 V_p)
Full scale	+10 dBm (±1 V_p)
Maximum with dither enabled	+8 dBm
Maximum nonoperating input level	+20 dBm (±3.16 V_p)
Maximum DC input voltage	±2 V
Impedance	50 Ω nominal
VSWR	
0.1 to 25 MHz	<1.5:1
25 to 32 MHz	<3:1
Coupling	AC
Analog bandwidth (-3dB)	10 kHz to 36 MHz
Frequency response (4-25 MHz)	
Relative (to response at 15 MHz)	<± 0.25 dB
Absolute	<± 0.6 dB
Absolute (using calibration table)	<± 0.5 dB
Dither frequency range	150 Hz to 4 MHz
Average noise density (4 to 32 MHz)	<-133 dBm/Hz
Signal-to-noise ratio (9 dBm signal, full bandwidth)	
Excluding dither below 4 MHz	>67 dB
Harmonic distortion (single-tone, 0 dBm signal, includes aliased harmonic distortion)	
4 to 25 MHz, dither enabled	<-80 dBm
0.1 to 32 MHz, dither disabled	<-75 dBm
Intermodulation distortion (2-tone, -3 dBm signals)	
4 to 25 MHz, dither enabled	<-85 dBm
0.1 to 32 MHz, dither disabled	<-80 dBm
Residual responses (input terminated)	<-85 dBm (<-95 dBfs)

Frequency

Internal sample clock	
Frequency	64/n MHz, $1 \le n \le 2^{16}$
Accuracy	<±25 ppm
Phase noise	
Offset	Density
100 Hz	<-100 dBc/Hz
1 kHz	<-120 dBc/Hz
10 kHz	<-130 dBc/Hz
100 kHz	<-130 dBc/Hz
Residual FM	<2 Hz_{p-p} in 10 ms

Digital Downconversion

Decimation rate	32 to 4,096
Tuning resolution	0.014901 Hz

Triggering

Modes	Immediate, software, digital
Sources	PXI<7..0>, PXI STAR
Export	PFI 1, PXI<7..0>
Slope	Rising, falling
Pretrigger depth	Up to 16 ms
Posttrigger depth	Up to 16 ms
Minimum pulse width	100 ns

External Trigger (PFI 1)

Connector	SMB male
Level	TTL
Maximum input voltage	5.5 V

External Frequency Reference Input

Connector	SMA female
Impedance	50 Ω nominal
Input amplitude	-5 dBm to +15 dBm
Maximum nonoperating input level	+16 dBm
Maximum DC input voltage	±3.5 VDC
Frequency range	10 MHz ±40 ppm

Power Requirements

+3.3 VDC (±5%)	<600 mA
+5 VDC (±5%)	<1.5 A
+12 VDC (±5%)	<450 mA
-12 VDC (±5%)	<35 mA

Physical

Dimensions	10 by 16 cm (3.9 by 6.3 in.) 1 slot

Environment

Operating temperature	0 to 50 °C
Storage temperature	-20 to 70 °C
Relative humidity	10 to 90%, noncondensing

Calibration

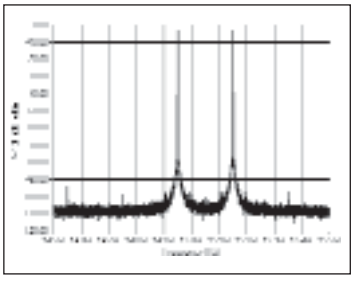
Interval	1 year
Warm-up time	10 minutes

Certifications and Compliances

CE Mark Compliance CE

Typical Performance Charts

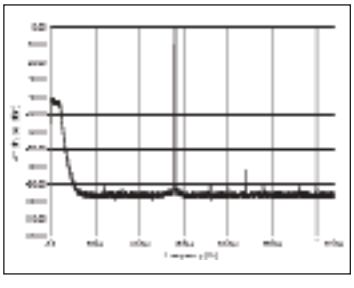
At operating environment of 22 °C



Intermodulation Distortion

Input: 14.95 MHz and 15.15 MHz at 3 dBm

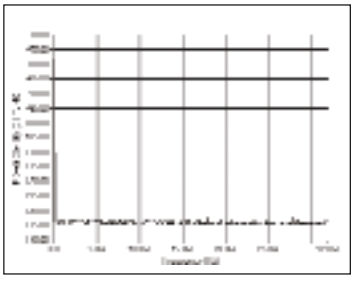
Intermodulation distortion refers to distortion that the PXI-5620 produces in response to two different input signals. This shows up in the frequency domain as spurious peaks at frequencies not harmonically related to the two input signals.



Harmonic Distortion

Input: 14 MHz at 0 dBm

Harmonic distortion refers to distortion produced by the PXI-5620 as a result of a single input frequency. It shows up at harmonics of the input signal frequency. In a sample system, some of those harmonics alias back to other frequencies within the Nyquist band.



Noise Density

Dither Disabled, Input Terminated

Noise density shows how much random noise the PXI-5620 produces with no input signal. It is termed "noise density" because it measures power per given frequency range (dBm/Hz). Over most of the band the noise density is -135 dBm/Hz, which means any 1 kHz band has a total noise power of -104 dBm.