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Find the *Teradyne / LitePoint / ZTEC Instruments ZT450PCI-21* at our website: ***Click HERE***

ZT450PXI & PCI Specifications

Digital Storage Oscilloscope

8-bit, 1 GS/s, 500 MHz, 2 Ch
8-bit, 2 GS/s, 500 MHz, 2 Ch
8-bit, 2.5 GS/s, 750 MHz, 2 Ch

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CE

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Analog Input

Channels — Quantity 2

Bandwidth (50 Ω)

Product Option	50 Ω **Typical Bandwidth**	50 Ω **Minimum Bandwidth**
ZT450-0X	500 MHz	400 MHz
ZT450-2X	500 MHz	400 MHz
ZT450-5X	750 MHz	650 MHz

Bandwidth (1 MΩ)

Product Option	1 MΩ **Typical Small Signal Bandwidth**	1 MΩ **Minimum Small Signal Bandwidth**
ZT450-0X	300 MHz	250 MHz
ZT450-2X	300 MHz	250 MHz
ZT450-50/51	300 MHz	250 MHz
ZT450-55/56	400 MHz	300 MHz
ZT450-55/56 using ZT6103 probe	450 MHz	400 MHz

Slew Rate = 500 V/µs*

*- limits the large signal BW

Due to an impedance mismatch between the signal generator and the oscilloscope, passing this test with the minimum signal verifies the typical performance on the 1 MΩ path.

Maximum Input (50 Ω) — ±5V (DC + peak AC)

Input load protection @ ±6 VDC

Maximum Input (1 MΩ) — ±210V [DC + peak AC (<10 kHz)]

Peak AC, de-rated 20 Db/decade above 10 kHz

Product Option	1 MΩ **Maximum Working Voltage**	1 MΩ **Maximum Range + Offset**
ZT450-0X	±210 V	±150 V
ZT450-2X	±210 V	±150 V
ZT450-5X	±210 V	±100 V

Input VSWR (50 Ω) — ≤ 1.4:1, DC to 50Ω Bandwidth

Input Bias (50 Ω) — ≤ ±40 Ma

Input Bias (1 MΩ) — ≤ ±1 Na

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Full Scale Input Range
& Offset Adjust

Impedance	ZT450-0X or ZT450-2X		ZT450-5X	
	Range	Offset	Range	Offset
1 MΩ	100 Vpp	±100V	100 Vpp	±50V
	50 Vpp	±100V	50 Vpp	±25V
	20 Vpp	±100V	20 Vpp	±10V
	10 Vpp	±100V	10 Vpp	±5V
	5 Vpp	±5V	5 Vpp	±2.5V
	2.5 Vpp	±5V	2.5 Vpp	±1.25V
	1 Vpp	±5V	1 Vpp	±0.5V
	0.5 Vpp	±5V	0.5 Vpp	±0.25V
			0.2 Vpp	±0.1V
			0.1 Vpp	±0.05V
50Ω	10 Vpp	±10V	10 Vpp	±5V
	5 Vpp	±10V	5 Vpp	±2.5V
	2 Vpp	±10V	2 Vpp	±1V
	1 Vpp	±10V	1 Vpp	±0.5V
	0.5 Vpp	±0.5V	0.5 Vpp	±0.25V
	0.25 Vpp	±0.5V	0.25 Vpp	±0.125V
	0.1 Vpp	±0.5V	0.1 Vpp	±0.05V
	0.05 Vpp	±0.5V	0.05 Vpp	±0.025V

DC Gain Accuracy

Product Option	DC Gain Accuracy
ZT450-0X	≤ ± 1.5% of full scale
ZT450-2X	≤ ± 1.5% of full scale
ZT450-5X	≤ ± 1.0% of full scale

DC Offset Accuracy

Product Option	DC Offset Accuracy
ZT450-0X	≤ ± (1% offset + 2% full scale)
ZT450-2X	≤ ± (1% offset + 2% full scale)
ZT450-5X	≤ ± (1% offset + 1% full scale)

DC Offset Drift

Product Option	DC Offset Drift
ZT450-0X	≤ ± (0.3% full scale) per °C
ZT450-2X	≤ ± (0.3% full scale) per °C
ZT450-5X	≤ ± (0.1% full scale) per °C

Impedance 1 MΩ || 12 Pf or 50 Ω

Impedance Accuracy ± 1%

Coupling DC or AC

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AC Coupling

200 kHz high pass (50Ω)
10 Hz high pass (1 MΩ)

Probe Attenuation

0.9 to 1000:1

Analog Filter

20 MHz or Bypass
Filter Stopband Rejection: approximately 3Db @ 20 MHz

RMS Noise (50Ω)

Product Option	RMS Noise (50 Ω)
ZT450-0X	≤ (350 µv + 0.5% range), 0.05 Vpp to 0.5 Vpp ≤ (3.5 mv + 0.5% range), 1 Vpp to 10 Vpp
ZT450-2X	≤ (350 µv + 0.5% range), 0.05 Vpp to 0.5 Vpp ≤ (3.5 mv + 0.5% range), 1 Vpp to 10 Vpp
ZT450-5X	≤ (100 Mv + 0.5% range) range

RMS Noise (1MΩ)

Product Option	RMS Noise (1 MΩ)
ZT450-0X	≤ (3.5 mv + 0.5% range), 0.5 Vpp to 5 Vpp ≤ (35 mv + 0.5% range), 10 Vpp to 100 Vpp
ZT450-2X	≤ (3.5 mv + 0.5% range), 0.5 Vpp to 5 Vpp ≤ (35 mv + 0.5% range), 10 Vpp to 100 Vpp
ZT450-50/51	≤ (1 mv + 0.5% range)
ZT450-55/56	≤ (500 µv + 0.5% range)

RMS Noise (20 MHz Filter)

≤ (0.25% range)

Connectors

BNC

Analog-to-Digital Converter

Resolution

8 bit

Sample Rate

Product Option	1 Channel **Maximum Sample Rate**	2 Channel **Maximum Sample Rate**
ZT450-0X	2 GS/s	1 GS/s
ZT450-2X	1 GS/s	500 MS/s
ZT450-5X	2.5 GS/s	1.25 GS/s

2.5 kS/s to 2-Channel Maximum Sample Rate in 1, 2.5, or 5 steps
1 GS/s, 1 channel interleaved (ZT450-2X)
2 GS/s, 1 channel interleaved (ZT450-0X or ZT450-5X)
2.5 GS/s, 1 channel interleaved (ZT450-5X)

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Acquisition Time Range	Minimum:	50 ns (ZT450-0X or ZT450-2X) 40 ns (ZT450-5X)
	Maximum:	6,710 seconds (32 MSample Memory) 419 seconds (2 MSample Memory)

Channel-to-Channel Skew — Channels at same input settings

Product Option	Channel-to-Channel Skew
ZT450-0X	≤ 200 ps
ZT450-2X	≤ 200 ps
ZT450-5X	≤ 100 ps

Waveform Memory

Total Memory	Up to 16M samples/channel Up to 32M samples/channel (1 channel interleaved)
Memory Options	2M and 32M samples total

Acquisition Modes

Types	Normal, Average, Envelope, and Equivalent-Time
Channels	Quantity 2, both inputs simultaneous
Waveform Size	32k samples maximum
Waveform Count	2 to 2048 waveforms
Averaging	16-bit waveform averaging resolution
Envelope	Minimum and Maximum Envelope
Equivalent-Time	High sample rate waveform reconstruction
Equivalent-Time Points	2 to 100 equivalent-time points per real-time point 2 to 100 times equivalent-time sample rate

Trigger

Trigger Source	Channels 1 to 2, External Trigger, Pattern, Software, Star Trigger, TTL Trigger0–7 (PXI Backplane or PCI Timing Expansion Connector)
Trigger Slope/Polarity	Positive or Negative

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Trigger Position	0% to 100% of waveform time + trigger delay ±1 sample interval position accuracy
Post-Trigger Delay	0 to 655 seconds
Pre-Trigger Delay	0 to waveform time
Trigger Hold Off	Programmable delay after trigger before recognizing next trigger event
Hold Off Range	0 to 655 seconds
Trigger B	Second edge trigger event qualifier
Pattern Trigger	Pattern match true or false
Pattern Sources	Channels 1 to 2, External Trigger, Star Trigger (PXI Backplane or PCI Timing Expansion Connector)
Event Trigger	Event Counter: 1 to 65535 trigger events
Trigger Modes	Edge, Pulse Width, Video
Edge Trigger Mode	Rising or Falling Edge
Pulse Width Trigger Mode	Triggers on pulse width greater than, less than, or between limits
Pulse Width Type	< limit1, > limit1, < limit1 & > limit2
Pulse Width Range	20 ns to 655 seconds
Pulse Width Resolution	10 ns
Video Trigger Mode	PAL (50 Hz), NTSC (60 Hz), SECAM (50 Hz) Standard, Field, Line selectable
Ch 1–2 Trigger Level	(offset – full scale/2) to (offset + full scale/2)
Ch 1–2 Trigger Sensitivity	5% of full scale (DC to 100 MHz) 10% of full scale (100 MHz to 500 MHz) 25% of full scale (> 500 MHz)
Ch 1–2 Trigger Bandwidth	≥ 400 MHz
Ch 1–2 Trigger Hysteresis	5% (overdrive required)
Ch 1–2 Level Resolution	0.025% of full scale

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Ch 1–2 Level Accuracy	±(2% setting + 2% full scale + offset accuracy)
Trigger Timestamp	100 ns resolution, 1 second rollover

TTL Trigger Outputs

Functionality	Event Output Signals
Outputs	TTL Trigger0–7 (PXI Backplane or PCI Timing Expansion Connector)
Source	Trigger Event, Arm Event, OPC, Constant State

External Trigger

Functionality	Trigger Input or Output
Maximum Input	0V to 5V, no damage
Trigger Input	TTL Compatible, 10 kΩ Input Impedance
Trigger Output	TTL Compatible into 50Ω
Trigger Output Source	Trigger Event, Arm Event, OPC, Constant State, 10MHz Reference Clock, 500 Hz Clock, 10 ns Pulse at 1 ms Repetition Interval
Connector	SMB

Arm

Functionality	Arm to qualify trigger event
Source	External Trigger, Software, Star Trigger, TTL Trigger0–7 (PXI Backplane or PCI Timing Expansion Connector)
Polarity	Positive or Negative

External Arm Input

Maximum Input	0V to 5V, no damage
Nominal Level	TTL Compatible

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Input Impedance	10 kΩ ±2%
Connector	SMB (Shared with Trigger I/O)

External Sampling Clock

Functionality	External Sampling Clock bypasses Phase Locked Loop
Synchronization	Both channels synchronized to external clock
Clock Rates	200 MHz to 1 GHz
Maximum Input	±5VDC, no damage
Input Signal Level	500 mVpp to 1 Vpp, sine or square wave
Input Impedance	AC coupled, 50Ω ±2%
Connector	SMB

10 MHz Time Base Reference

Clock Source	Internal TCXO, PXI Backplane or PCI Timing Expansion Connector
Internal TCXO	± 2.5 ppm accuracy

Data Processing

Auto Scale	Automatic adjust to input signals: Input Range, Offset, Sample Rate, Trigger Source, and Trigger Level
Self-Calibration	Automatic internal calibration: Input DC Offset

Measurements

Measurements	Min, Max, Low, High, Mid, Average, Amplitude, Peak-to-Peak, DC RMS, AC RMS, +Width, –Width, Period, Frequency, +Duty, –Duty, Phase, Rise Time, Rise Overshoot, Rise Preshoot, Rise Crossing Time, Fall Time, Fall Overshoot, Fall Preshoot, Fall Crossing Time, Time of Maximum, Time of Minimum, Cycle Average, Cycle RMS, Cycle Frequency, Cycle Period, AC High-Precision, DC High-Precision
Measurement Methods	Entire Waveform, Gated by Time, Gated by Points

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Measurement Levels	Low, Mid, High reference levels for edge measurements set in absolute voltages or relative percentages

Measurement Accuracy

Delta DC Voltage	± (DC gain accuracy)
Absolute DC Voltage	± [(DC gain accuracy)+(offset accuracy)]
Time	± (time resolution)
Frequency	± [1/(time resolution)]

Note: time resolution = one sample interval or one ETS sample interval (for ETS acquisition)

Reference Waveforms

Reference Channels	Quantity 4
Reference Storage	Non-volatile memory storage
Reference Size	32k maximum waveform size

Calculations

Calculate Channels	Quantity 2
Calculate Size	32k maximum waveform size
Calculate Functions	Add, Subtract, Multiply, Copy, Invert, Integral, Derivative, Absolute Value, Limit Test, Mask Test, Frequency Transform, Time Transform
Limit Test	Measurement Limit Range Testing or Waveform Mask Testing
Limit Test Reports	Measurement maximum, minimum, average, current value, and pass/fail counts
Frequency Transform	FFT Magnitude
FFT Windowing	Rectangular, Hamming, Hanning, Blackman
Time Transform	Infinite Impulse Response (IIR) filtering
IIR Filter Count	2 to 40 data points

Instrument Setup Storage

Reset	Non-volatile storage of default instrument setup configuration

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Save & Recall	Non-volatile storage of 31 instrument setup configurations

Data Interface

PCI Bus	33 MHz, 32 bit address, 16 bit data
PCI Voltage	Universal, +3.3V or +5V
PCI Compatibility	Version 2.2
PXI Signals	PXI_TRGn input/output selectable PXI_STAR input 10 MHz reference input Left and right side buses not used
Manufacturer ID	4172 ($104C_{16}$)
Model Code	44128 ($AC60_{16}$)

PXI J2 Trigger & Clock Pin Usage

Pin A16	PXI Trigger 1	(TTL level bidirectional)
Pin A17	PXI Trigger 2	(TTL level bidirectional)
Pin A18	PXI Trigger 3	(TTL level bidirectional)
Pin B16	PXI Trigger 0	(TTL level bidirectional)
Pin B18	PXI Trigger 4	(TTL level bidirectional)
Pin C18	PXI Trigger 5	(TTL level bidirectional)
Pin D17	PXI Star Trigger	(TTL level input)
Pin E16	PXI Trigger 7	(TTL level bidirectional)
Pin E17	PXI CLK10 In	(TTL level input)
Pin E18	PXI Trigger 6	(TTL level bidirectional)

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LED Indicators

RDY	Unit has passed power-up self-diagnostics. Toggles when unit has an error pending in error queue.
TRG	Flashes when trigger event occurs

Physical

Physical size	Single-Wide 3U CompactPCI/PXI Instrument (PXI) Single-Slot Short PCI Card (PCI)
Weight	1 lb.

DC Power

Cooling & Power Consumption

Product Option	Typical Cooling & Power	Maximum Cooling & Power
ZT450-00	15.5 W	20.0 W
ZT450-01	18.8 W	23.3 W
ZT450-20	14.8 W	19.1 W
ZT450-21	18.1 W	22.4 W
ZT450-50	19.6 W	27.2 W
ZT450-51	22.9 W	30.5 W

Note: Optional PCI Cooling Fan adds 0.12A to +5VDC current requirements and 0.6W to total power consumption.

Power Supplies

Product Option	Voltage	Typical Current	Maximum Current
ZT450-00	+3.3V	2.5A	2.8A
	+5V	0.8A	1.2A
	+12V	0.02A	0.05A
	–12V	0.25A	0.35A
ZT450-01	+3.3V	3.5A	3.8A
	+5V	0.8A	1.2A
	+12V	0.02A	0.05A
	–12V	0.25A	0.35A

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ZT450-20	+3.3V +5V +12V –12V	2.3A 0.8A 0.02A 0.25A	2.5A 1.2A 0.05A 0.35A
ZT450-21	+3.3V +5V +12V –12V	3.3A 0.8A 0.02A 0.25A	3.5A 1.2A 0.05A 0.35A
ZT450-50	+3.3V +5V +12V –12V	3.0A 1.3A 0.02A 0.25A	3.3A 2.3A 0.05A 0.35A
ZT450-51	+3.3V +5V +12V –12V	4.0A 1.3A 0.02A 0.25A	4.3A 2.3A 0.05A 0.35A

Temperature Range

Operating	0 °C to +40 °C Ambient
Storage	-40 °C to +75 °C
Over-Temp Protection	Automatic shutdown if internal temperature is greater than +60 °C
Calibration Range	+20 °C to +30 °C Ambient, after a 20 minute warm-up period,to meet all calibration specification accuracies.

Relative Humidity

Operating or Storage	10 to 90%, non-condensing, up to +40 °C

Altitude

Operating	Up to 2,000 m
Storage	Up to 15,000 m

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Safety

This product is designed to meet the requirements of the following standard of safety for electrical equipment for measurement, control and laboratory use:

EN 61010-1

Electromagnetic Compatibility

CE Marking EN 61326-1:1997 with A1:1998 and A2:2001 Compliant
FCC Part 15 (Class A) Compliant

Emissions

EN 55011	Radiated Emissions, ISM Group 1, Class A, distance 10 m, emissions < 1 GHz
EN 55011	Conducted Emissions, Class A, emissions < 30 MHz

Immunity

EN 61000-4-2	Electrostatic Discharge (ESD), 4 kV by Contact, 8 kV by Air
EN 61000-4-3	RF Radiated Susceptibility, 10 V/m
EN 61000-4-4	Electrical Fast Transient Burst (EFTB), 2 kV AC Power Lines
EN 61000-4-5	Surge
EN 61000-4-6	Conducted Immunity
EN 61000-4-8	Power Frequency Magnetic Field, 30 A/m
EN 61000-4-11	Voltage Dips and Interrupts

CE Compliance

This product meets the necessary requirements of applicable European Directives for CE Marking as follows:

73/23/EEC	Low Voltage Directive (Safety)
89/336/EEC	Electromagnetic Compatibility Directive (EMC)

See Declaration of Conformity for this product for additional regulatory compliance information.

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