

M-Class Oscilloscopes Specifications

PCI, PXI, VXI, & LXI



ZT4610 Series: 8-bit, 4 GS/s, 1 GHz, 2 or 4 Ch

ZT4210 Series: 8-bit, 1 GS/s, 300 MHz, 2 or 4 Ch

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Acquisition

Sample Rate Sample rates are available in steps on 1,2 and 5.

ZT4610:
 50 kS/s to 2 GS/s, non-interleaved real-time
 4 GS/s, interleaved real-time
 4 GS/s to 200 GS/s, interpolated or equivalent-time

ZT4210:
 10 kS/s to 500 MS/s, non-interleaved real-time
 1 GS/s, interleaved real-time
 1 GS/s to 100 GS/s, interpolated or equivalent-time

Non-Interleaved Acquisition 2-channel @ up to 2 GS/s real-time (ZT4611)
 4-channels @ up to 2 GS/s real-time (ZT4612)
 2-channels @ up to 500 MS/s real-time (ZT4211)
 4-channels @ up to 500 MS/s real-time (ZT4212)

Interleaved Acquisition 1-channel @ 4 GS/s real-time (ZT4611)
 2-channels @ 4 GS/s real-time (ZT4612)
 1-channel @ 1 GS/s real-time (ZT4211)
 2-channels @ 1 GS/s real-time (ZT4212)

Sampling Modes Normal: single-shot acquisition
 Average: multiple-capture averaging
 Envelope: multiple-capture minimum & maximum detection
 Equivalent time: multiple-capture high-rate reconstruction
 Peak detect: single-shot 10X over-sampling envelope detection
 High resolution: single-shot 10X over-sampling averaging
 Fast: multiple acquisitions

Multiple-Capture Count 2 to 65536 waveforms in powers of 2

Acquisition Re-Arm Time ≤ 10 μs (ZT4610)
 ≤ 5 μs (ZT4210)

Memory Depth Up to 32M samples/channel (ZT4610, non-interleaved)
 Up to 64M samples/channel (ZT4610, interleaved)
 Up to 128M samples/channel (ZT4210, non-interleaved)
 Up to 256M samples/channel (ZT4210, interleaved)

Total Memory Options

Product Option	Standard Memory	Extended Memory
ZT4611	16M Samples	64M Samples
ZT4612	32M Samples	128M Samples
ZT4211	256M Samples	n/a
ZT4212	512M Samples	n/a

Maximum Record Length

Product Option	Non-Interleaved	Interleaved
ZT4610 Standard Memory	8M Samples	16M Samples
ZT4610 Extended Memory	32M Samples	64M Samples
ZT4210	128M Samples	256M Samples

Waveform Size

Acquisition Mode	Minimum	Maximum
	Waveform Size	Waveform Size
Normal	10 Samples	Maximum Record Length (see above)
All other modes	10 Samples	512k Samples

Segmented Memory

View & compare history of previous waveforms in memory
View component waveforms in memory when averaging
≤ 10 μs acquisition re-arm time between segments (ZT4610)
≤ 5 μs acquisition re-arm time between segments (ZT4210)

Memory Option	Maximum Segments
ZT4611 Standard Memory	8k waveforms @ ≤1k samples
ZT4612 Extended Memory	32k waveforms @ ≤1k samples
ZT4211/ZT4212	32k waveforms @ ≤4k samples

Vertical

Number of Channels

ZT4x11: Quantity 1 (interleaved acquisition)
ZT4x11: Quantity 2 (non-interleaved acquisition)
ZT4x12: Quantity 2 (interleaved acquisition)
ZT4x12: Quantity 4 (non-interleaved acquisition)

Connectors

BNC

Maximum Input (50 Ω)

±5 V (DC + peak AC), CAT I (ZT4610)
±5 V (DC + peak AC), CAT II (ZT4210)
Input load protection @ ±6 VDC

Maximum Input (1 MΩ)

±210 V [DC + peak AC (<100 kHz)], CAT I (ZT4610)
±300 V [DC + peak AC (<100 kHz)], CAT II (ZT4210)
Peak AC, de-rated 20 dB/decade above 100 kHz

ZT4610 Full Scale Input Range & Offset Adjust¹²

Impedance	Range	Full Scale	Offset	
1 MΩ	10 V/div	100 Vpp	±50V	
	4 V/div	40 Vpp	±50V	
	2 V/div	20 Vpp	±50V	
	1 V/div	10 Vpp	±50V	
	500 mV/div	5 Vpp	±50V	
	200 mV/div	2 Vpp	±4V	
	100 mV/div	1 Vpp	±4V	
	50 mV/div	500 mVpp	±4V	
	25 mV/div	250 mVpp	±4V	
	10 mV/div	100 mVpp	±4V	
	5 mV/div	50 mVpp	±4V	
	2.5 mV/div	25 mVpp	±4V	
	1.25 mV/div	12.5 mVpp	±4V	
	50Ω	1 V/div	10 Vpp	0V
		500 mV/div	5 Vpp	±2.5V
200 mV/div		2 Vpp	±4V	
100 mV/div		1 Vpp	±2V	
50 mV/div		500 mVpp	±1V	
25 mV/div		250 mVpp	±0.5V	
10 mV/div		100 mVpp	±0.2V	
5 mV/div		50 mVpp	±0.1V	
2.5 mV/div		25 mVpp	±0.1V	
1.25 mV/div		12.5 mVpp	±0.1V	

ZT4210 Full Scale Input Range & Offset Adjust²³

Impedance	Range	Full Scale	Offset	Maximum Range + Offset	
1 M Ω	40 V/div	400 Vpp	0V	$\pm 200V$	
	20 V/div	200 Vpp	$\pm 100V$	$\pm 200V$	
	8 V/div	80 Vpp	$\pm 100V$	$\pm 140V$	
	4 V/div	40 Vpp	$\pm 100V$	$\pm 120V$	
	2 V/div	20 Vpp	$\pm 100V$	$\pm 110V$	
	1 V/div	10 Vpp	$\pm 100V$	$\pm 105V$	
	500 mV/div	5 Vpp	$\pm 2.5V$	$\pm 5V$	
	200 mV/div	2 Vpp	$\pm 2.5V$	$\pm 3.5V$	
	100 mV/div	1 Vpp	$\pm 2.5V$	$\pm 3.0V$	
	50 mV/div	500 mVpp	$\pm 2.5V$	$\pm 2.75V$	
	25 mV/div	250 mVpp	$\pm 2.5V$	$\pm 2.625V$	
	10 mV/div	100 mVpp	$\pm 2.5V$	$\pm 2.55V$	
	5 mV/div	50 mVpp	$\pm 2.5V$	$\pm 2.525V$	
	2.5 mV/div	25 mVpp	$\pm 2.5V$	$\pm 2.5125V$	
	1.25 mV/div	12.5 mVpp	$\pm 2.5V$	$\pm 2.50625V$	
	50 Ω	1 V/div	10 Vpp	0V	$\pm 5V$
		500 mV/div	5 Vpp	$\pm 2.5V$	$\pm 5V$
200 mV/div		2 Vpp	$\pm 2.5V$	$\pm 3.5V$	
100 mV/div		1 Vpp	$\pm 2.5V$	$\pm 3.0V$	
50 mV/div		500 mVpp	$\pm 2.5V$	$\pm 2.75V$	
25 mV/div		250 mVpp	$\pm 2.5V$	$\pm 2.625V$	
10 mV/div		100 mVpp	$\pm 2.5V$	$\pm 2.55V$	
5 mV/div		50 mVpp	$\pm 2.5V$	$\pm 2.525V$	
2.5 mV/div		25 mVpp	$\pm 2.5V$	$\pm 2.5125V$	
1.25 mV/div		12.5 mVpp	$\pm 2.5V$	$\pm 2.50625V$	

Analog Bandwidth

ZT4610, 50 Ω :

DC to 1000 MHz typical, 900 MHz minimum (-3dB) *

*50mVpp and 100mVpp ranges 500 MHz (-3dB) 900 MHz (-6dB)

ZT4610, 1M Ω :

DC to 400 MHz typical, 300 MHz minimum

Due to an impedance mismatch between the signal generator and the oscilloscope, passing this test with a 300 MHz signal verifies 400 MHz performance on the 1 M Ω path.

ZT4210:

DC to 300 MHz typical, 250 MHz minimum

Due to an impedance mismatch between the signal generator and the oscilloscope, passing this test with a 200 MHz signal verifies 250 MHz performance on the 1 M Ω path.

Analog Bandwidth, Probe
ZT6103 Passive X10³

DC to 450 MHz typical, 400 MHz minimum (ZT4610)
DC to 300 MHz typical, 250 MHz minimum (ZT4210)

Rise time⁴

350 ps (ZT4610, 50 Ω)
700 ps (ZT4610, 1 M Ω)
1.15 ns (ZT4210)

Slew Rate

10,000 V/ μ s (ZT4610, 50 Ω)
1,000 V/ μ s (ZT4610, 1 M Ω)
2,000 V/ μ s (ZT4210)

DC Gain Accuracy

< $\pm 1\%$ full scale range

DC Offset Accuracy (+25 $^{\circ}$ C)

< $\pm(1\%$ full scale range + 1% offset + 1 mV) (ZT4610, 50 Ω)
< $\pm(1\%$ full scale range + 1% offset + 5 mV) (ZT4610, 1M Ω)
< $\pm(1\%$ full scale range + 1% offset + 2 mV) (ZT4210, 50 Ω , $\leq 0.1V_{pp}$)
< $\pm(1\%$ full scale range + 1% offset + 1 mV) (ZT4210, 50 Ω , $\geq 0.25V_{pp}$)
< $\pm(1\%$ full scale range + 1% offset + 2 mV) (ZT4210, 1M Ω , $\leq 0.1V_{pp}$)
< $\pm(1\%$ full scale range + 1% offset + 1 mV) (ZT4210, 1M Ω , $\leq 5V_{pp}$, $\geq 0.25V_{pp}$)
< $\pm(1\%$ full scale range + 1% offset + 50 mV) (ZT4210, 1M Ω , $\geq 10V_{pp}$)

DC Offset Drift (per °C)	$< \pm 0.1\%$ full scale range/°C (ZT4610) $< \pm(0.05\%$ full scale range + 250 μ V) (ZT4210, 50 Ω , ≤ 0.50 Vpp range) $< \pm(0.05\%$ full scale range + 100 μ V) (ZT4210, 50 Ω , ≥ 1.0 Vpp range) $< \pm(0.05\%$ full scale range + 275 μ V) (ZT4210, 1M Ω , ≤ 0.50 Vpp range) $< \pm(0.05\%$ full scale range + 100 μ V) (ZT4210, 1M Ω , ≥ 1.0 Vpp ≤ 5 Vpp range) $< \pm(0.05\%$ full scale range + 10 mV) (ZT4210, 1M Ω , ≥ 10 Vpp range)
Impedance	1 M Ω 12 pF or 50 Ω
Impedance Accuracy	$\pm 1\%$
Input VSWR (50 Ω)	$\leq 1.4:1$, DC to 1000 MHz (ZT4610) $\leq 1.4:1$, DC to 250 MHz (ZT4210)
Input Bias	$\leq \pm 10$ μ A (50 Ω) $\leq \pm 1$ nA (1 M Ω)
Coupling	DC or AC
AC Coupling	200 kHz high-pass (50 Ω) 10 Hz high-pass (1 M Ω)
Analog Filter	20 MHz or Bypass Filter Stopband Rejection: approximately 3dB @ 20 MHz
Probe Attenuation	0.9 to 1000:1
RMS Noise	
ZT4610	$\leq (0.5\%$ of full scale range + 350 μ V) (50 Ω Full Bandwidth) $\leq (0.5\%$ of full scale range) (50 Ω + 20 MHz Filter) $\leq (0.5\%$ of full scale range + 700 μ V) (1M Ω Full Bandwidth) $\leq (0.5\%$ of full scale range + 350 μ V) (1M Ω + 20 MHz Filter)
ZT4210	
Full Scale ≥ 100 mVpp	$\leq (0.3\%$ of full scale range + 400 μ V) (50 Ω Full Bandwidth) $\leq (0.3\%$ of full scale range) (50 Ω + 20 MHz Filter) $\leq (0.5\%$ of full scale range + 700 μ V) (1M Ω Full Bandwidth) $\leq (0.5\%$ of full scale range) (1M Ω + 20 MHz Filter)
ZT4210	
Full Scale < 100 mVpp	$\leq (0.5\%$ of full scale range + 400 μ V) (50 Ω Full Bandwidth) $\leq (0.5\%$ of full scale range) (50 Ω + 20 MHz Filter) $\leq (0.5\%$ of full scale range + 700 μ V) (1M Ω Full Bandwidth) $\leq (0.5\%$ of full scale range + 50uV) (1M Ω + 20 MHz Filter)
Power Supply Noise Rejection	25dB (ZT4210 PCI/PXI only)
Channel-to-Channel Isolation	DC to 100 MHz: ≥ 50 dB 100 MHz to 1 GHz: ≥ 40 dB (ZT4610) 100 MHz to 250 MHz: ≥ 40 dB (ZT4210)
Digitizer Resolution	8 bits (0.4% of full scale) Up to 32 bits with averaging

Dynamic Range

ZT4610 (2GS/s, 50Ω):

Input Range & Signal Frequency	Signal-to Noise Ratio (SNR)	Total Harmonic Distortion (THD)	Signal-to-Noise + Distortion (SINAD)
10 Vpp, 10.7 MHz	46.6 dBc	-53.0 dBc	45.7 dBc
1 Vpp, 10.7 MHz	47.9 dBc	-56.8dBc	47.4 dBc
0.1 Vpp, 10.7 MHz	34.0 dBc	-56.8dBc	34.0 dBc
10 Vpp, 101 MHz	39.5 dBc	-45.0 dBc	38.4 dBc
1 Vpp, 101 MHz	41.3 dBc	-46.9 dBc	40.2 dBc
0.1 Vpp, 101 MHz	34.0 dBc	-48.0 dBc	33.8 dBc

ZT4210 (500MS/s, 50Ω):

Input Range & Signal Frequency	Signal-to Noise Ratio (SNR)	Total Harmonic Distortion (THD)	Signal-to-Noise + Distortion (SINAD)
10 Vpp, 10.7 MHz	41.21 dBc	-53.15 dBc	40.94 dBc
1 Vpp, 10.7 MHz	41.93 dBc	-59.53 dBc	41.86 dBc
0.1 Vpp, 10.7 MHz	33.48 dBc	-57.59 dBc	33.47 dBc
10 Vpp, 60.1 MHz	41.24 dBc	-48.68 dBc	40.51 dBc
1 Vpp, 60.1 MHz	41.36 dBc	-49.93 dBc	40.79 dBc
0.1 Vpp, 60.1 MHz	33.16 dBc	-48.12 dBc	33.02 dBc

Horizontal

Sweep Time Range⁵

Minimum: 250 ps/div (2.5 ns total) (ZT4610)
 1 ns/div (10 ns total) (ZT4210)
 Maximum: 10 s/div (100 seconds total)

Horizontal Position

Pre-Trigger: 0 to 100% of acquisition window

Post-Trigger: 10,000*Gate Resolution
 Gate Resolution Steps: 10ns, 100ns, 1us, 10us, 100us, 1ms, 10ms
 Gate Resolution ≤ (Segment size – (Sweep Points + 150))/Sample Rate
 Segment size = 2^x > Sweep points + 150 where
 { x ∈ Z : 25 ≥ x ≥ 10 } for ZT4610 or
 { x ∈ Z : 27 ≥ x ≥ 12 } for ZT4210
 ±1 sample interval position accuracy

Channel-to-Channel Skew

Channels at same input settings
 Channels 1-to-2: ≤ 100 ps
 Channels 3-to-4: ≤ 100 ps (ZT4x12)
 Channels 1-to-3, 1-to-4, 2-to-3, 2-to-4: ≤ 200 ps (ZT4x12)

Skew Adjust

ZT4610: n/a

ZT4210:
 ±10 μs channel-to-channel skew adjustment
 1 sample interval resolution
 ±1 sample interval accuracy

Timebase Reference

10 MHz

Timebase Reference Source

Internal TCXO, External Input, Backplane (PXI, VXI),
 Timing Expansion Connector (PCI)

Internal TCXO Timebase

± 2.5 ppm accuracy

Timebase Output	External Output, Timing Expansion Connector Reference I/O (PCI)
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Trigger

Sweep Modes	Auto or normal triggered
Trigger Source	Channels 1 to 2, Channels 3 to 4 (ZT4x12), External Input, Pattern, Software, TTL Trigger 0-7, Star Trigger (PXI), ECL Trigger 0-1 (VXI)
Trigger Slope/Polarity	Positive or Negative
Trigger B	Qualify trigger on second source for edge trigger event
Trigger A Holdoff	Programmable delay after trigger A before recognizing next trigger A event
Trigger B Holdoff	Programmable delay after trigger A before recognizing trigger B event
Trigger A or B Holdoff Range	0 to 100 seconds
Trigger A or B Event Counter	Qualify trigger on N th trigger event, N = 1 to 65536
Trigger A Modes	Edge, Pattern, State, Pulse Width, Video
Trigger B Modes	Edge, Pattern
Edge Trigger Mode	Rising or falling edge
Pattern Trigger Mode	Pattern match true or false
Pattern Sources	Channels 1 to 2, Channels 3 to 4 (ZT4x12), External Input, Pattern, Software, TTL Trigger 0-7, Star Trigger (PXI), ECL Trigger 0-1 (VXI)
State Trigger Mode	Edge event when pattern match true or false Pattern source used as Arm qualifier
Pulse Width Trigger Mode	Triggers on pulse width greater than, less than, within limits, or outside limits
Pulse Width Type	< limit1, > limit1, < limit1 & > limit2, > limit1 & < limit2
Pulse Width Limits	10 ns to 500 ms, 5ns resolution, ±5ns accuracy
Pulse Width Minimum	2 ns pulse width captured for < limit1
Video Trigger Mode	PAL (50 Hz), NTSC (60 Hz), SECAM (50 Hz) Standard, Field, Line selectable
Trigger Timestamp	100 ns resolution, 1 second rollover

Trigger, Analog Input

Analog Input Triggers	Channels 1 & 2, Channels 3 & 4 (ZT4x12)
Trigger Level	(offset – full scale range/2) to (offset + full scale range/2)
Trigger Sensitivity	5% of full scale range (ZT4610, DC to 500 MHz) (ZT4210, DC to 100 MHz) 10% of full scale range (ZT4610, > 500 MHz), (ZT4210, > 100 MHz)
Trigger Bandwidth	DC to 500 MHz minimum (ZT4610) DC to 300 MHz typical, 250 MHz minimum (ZT4210)
Glitch Detection	≥ 250 ps glitch captured in edge trigger mode (ZT4610) ≥ 500 ps glitch captured in edge trigger mode (ZT4210)
Trigger Hysteresis	2.5% (overdrive required)
Trigger Level Resolution	0.025% of full scale range
Trigger Level Accuracy	±(2% full scale range + 5mV + offset accuracy)

External Input

Functionality	External Trigger, External 10 MHz Timebase Reference, or External Arm
Maximum Input	±5 V (DC + peak AC), CAT I
Threshold Adjustment	±2V
Threshold Accuracy	±20 mV
Threshold Resolution	0.5 mV
Input Impedance	1 MΩ 30 pF or 50 Ω
Impedance Accuracy	± 2%
Input Bandwidth	300 MHz typical 250 MHz minimum
Input Hysteresis	20 mV (overdrive required)
Connector	BNC (VXI, LXI) SMB (PCI, PXI)

External Output

Functionality	Trigger Output, 10 MHz Timebase Reference Output, Event Output, Programmable Clock Output, Programmable Pulse Output, Limit Test Successful, and 10 kHz Probe Compensation Output
Output Level	TTL Compatible into High Impedance (≥ 200 Ω) ± 24 mA Output Drive Capability

Output Enable	Tri-State Output Capability
Output Source	Arm Event, Trigger A Event, Trigger B Event, Trigger Complete, Capture Complete, Operation Complete, Master Summary Status, Constant Level, Reference Clock, Programmable Clock, Programmable Pulse, Limit Test Successful Event, Probe Compensation
Output Event Pulse	Programmable from 50 ns to 0.163 seconds
Programmable Clock	Clock Period: 26.667 ns to 100 seconds 50% Duty Cycle
Programmable Pulse	Pulse Repetition Interval: 50 ns to 100 seconds Pulse Width: 26.667 ns
Probe Compensation	10kHz Clock which can be used to compensate probes
Connector	BNC (VXI, LXI) SMB (PCI, PXI)

Event Outputs

Functionality	Event Output Signals
Outputs	TTL Trigger 0-7, ECL Trigger 0-1 (VXI) Timing Expansion Connector (PCI)
Source	Arm Event, Trigger A Event, Trigger B Event, Trigger Complete, Capture Complete, Operation Complete, Master Summary Status, Constant Level
Output Event Pulse	Programmable from 50 ns to 0.163 seconds

Arm

Functionality	Arm to qualify trigger event
Source	External Input, TTL Trigger 0-7, Star Trigger (PXI), ECL Trigger 0-1 (VXI), Software
Polarity	Positive or Negative

Measurements

Measurements	AC RMS, Amplitude, Average, Cycle Average, Cycle Frequency, Cycle Period, Cycle RMS, DC RMS, Duty Cycle High, Duty Cycle Low, ENOB, Number of Falling Edges, Fall Crossing Time, Fall Overshoot, Fall Preshoot, Fall Time, Frequency, High, Low, Maximum, Mid, Minimum, Peak-to-Peak, Period, Phase, Pulse Width Positive, Pulse Width Negative, Number of Rising Edges, Rise Crossing Time, Rise Overshoot, Rise Preshoot, Rise Time, SFDR, SINAD, SNR, Standard Deviation, THD, Time of Maximum, Time of Minimum
Edge Measurements	Nth edge selectable, N = 1 to 65535
Maximum Measurements	Nth maximum selectable, N = 1 to 100,

	Applies to Maximum and Time of Maximum measurements
Measurement Methods	Entire Waveform, Gated by Time, Gated by Points, Gated by Frequency, Gated by Cursors
Measurement Levels	Low, Mid, High reference levels for edge measurements set in absolute voltages or relative percentages
Cursors	Quantity 2 Horizontal & Vertical Axis Location Markers X, Y, DX & DY Measurements
Measurement Lists	Quantity 4 Lists Up to eight measurements that are performed upon acquisition Stored for rapid measurement setup
Measurement Trending	History buffer of past measurement data stored in Calculate channel (See Calculate section.)
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, one equivalent-time sample interval, or one interpolated-time sample interval (depending upon acquisition mode)

Reference Waveforms

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

Calculations

Calculate Channels	Quantity 4
Calculate Size	512k sample maximum waveform size
Calculate Data	32-bit resolution
Calculate Functions	Add, Subtract, Multiply, Copy, Invert, Integral, Derivative, Absolute Value, Limit Test, Mask Test, Frequency Transform, Time Transform, Histogram, Measurement Trending
Limit Test	Measurement Limit Range Testing or Waveform Mask Testing
Limit Test Reporting	Measurement maximum, minimum, average, current value, pass/fail counts

Frequency Transform	FFT Magnitude
FFT Windowing	Rectangular, Hamming, Hanning, Blackman, Flattop
FFT Data Format	Linear Magnitude, Logarithmic Magnitude, Phase, Real, Imaginary
Time Transform	Digital Infinite Impulse Response (IIR) filter
IIR Filter Type	Auto-generate: low-pass, 2 to 40 data point smoothing
Histogram	65536 bins for up to 16-bit histogram horizontal resolution
Measurement Trending	Historical waveform of past measurement data Provides trend data of 1 measurement point per capture

Data Processing & Download

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 Zero, Input DC Offset Adjust Scale Factor, ADC balance (ZT4610), ADC timing (ZT4610)
Waveform Data Formats	8-bit, 16-bit, 32-bit, 32-bit floating point, 64-bit floating point, Intel or Motorola Byte Order
Waveform Download Mode	Normal: every real-time data point Decimated: every Nth real-time point (N = 2 to 100,000) Interpolated: N points for every real-time point (N = 2 to 100), points interpolated by sin(x)/x reconstruction

Instrument Setup Storage

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

PCI/PXI Data Interface

PCI Bus	33 MHz, 32 bit
PCI Data Transfer Rate	132 Mbyte/s burst up to 120 Mbyte/s sustained ⁶
PCI Voltage	Universal, +3.3V or +5V
PCI Compatibility	Version 2.2
PXI Compatibility	PXI Standard Slot and PXI Express Hybrid Slot Compatible

PXI Signals (XJ4 connector) PXI_TRIG0-7 input/output selectable
 PXI_STAR input
 10 MHz reference input
 Left and right side buses not used

Primary ID 3712 (0E80₁₆)

Secondary ID ZT4611: 4611 (1203₁₆)
 ZT4611: 4611 (1204₁₆)
 ZT4211: 4211 (1073₁₆)
 ZT4212: 4212 (1074₁₆)

VXI Data Interface

Command Interface A16 message-based servant, SCPI compatible

Interrupt Operation Programmable interrupter, Level 1–7

Data Interface 32k Byte A32 register-based (ZT4610)
 A16 register-based DMA (ZT4210)

Manufacturer ID 3712 (0E80₁₆)

Secondary ID ZT4610: 461 (1CD₁₆)
 ZT4210: 421 (1A5₁₆)

LXI Data Interface

Command Interface LAN 10/100,
 USB 2.0 Full-Speed 12 MB/s,
 SCPI compatible

Manufacturer ID 3712 (0E80₁₆)

Secondary ID ZT4610: 461 (1CD₁₆)
 ZT4210: 421 (1A5₁₆)

PXI XJ4 Trigger & Clock Pin Usage

Pin A5	PXI Trigger 3	(TTL level bi-directional)
Pin A6	PXI Trigger 2	(TTL level bi-directional)
Pin A7	PXI Trigger 1	(TTL level bi-directional)
Pin B5	PXI Trigger 4	(TTL level bi-directional)
Pin B7	PXI Trigger 0	(TTL level bi-directional)
Pin C5	PXI Trigger 5	(TTL level bi-directional)
Pin D6	PXI Star Trigger	(TTL level input)
Pin E5	PXI Trigger 6	(TTL level bi-directional)
Pin E6	PXI CLK10	(TTL level input)
Pin E7	PXI Trigger 7	(TTL level bi-directional)

PCI Timing Expansion Connector Pin Usage

Pin 1	Reference	(TTL level bi-directional)
Pin 3	Star Trigger	(TTL level bi-directional)
Pin 5	Trigger 7	(TTL level bi-directional)
Pin 7	Trigger 6	(TTL level bi-directional)
Pin 9	Trigger 5	(TTL level bi-directional)
Pin 11	Trigger 4	(TTL level bi-directional)
Pin 13	Trigger 3	(TTL level bi-directional)
Pin 15	Trigger 2	(TTL level bi-directional)
Pin 17	Trigger 1	(TTL level bi-directional)
Pin 19	Trigger 0	(TTL level bi-directional)

VXIbus P2 Trigger & Clock Pin Usage

Pin A1	ECLTRG0	(ECL level bi-directional)
Pin A3	ECLTRG1	(ECL level bi-directional)
Pin A23	TTLTRG0*	(TTL level bi-directional)
Pin A24	TTLTRG2*	(TTL level bi-directional)
Pin A26	TTLTRG4*	(TTL level bi-directional)
Pin A27	TTLTRG6*	(TTL level bi-directional)
Pin C1	CLK10+	(ECL level input)
Pin C2	CLK10-	(ECL level input)
Pin C23	TTLTRG1*	(TTL level bi-directional)
Pin C24	TTLTRG3*	(TTL level bi-directional)
Pin C26	TTLTRG5*	(TTL level bi-directional)
Pin C27	TTLTRG7*	(TTL level bi-directional)

LED Indicators

Ready(RDY)	OFF: Hardware failure ON: Unit has passed power-up self-diagnostics TOGGLE: unit has an error pending in error queue
Host(HST/LAN)	OFF: Interface fault ON: Normal interface operation TOGGLE: device identify command received
Trigger(TRG)	OFF: trigger event not detected ON/PULSE: trigger complete event detected
Active(ACT)	OFF: Instrument Idle ON/PULSE: Data acquisition initiated
1588 Clock Status (LXI only)	OFF: IEEE 1588 clock not synchronized or fault ON: clock locked as IEEE 1588 slave TOGGLE @ 1s: clock synchronized as IEEE 1588 master TOGGLE @ 2s: clock synchronized as IEEE 1588 grand master

Power (PWR, LXI only)

ON: Instrument is powered on

OFF: Instrument is powered off

Status Reporting

IEEE-488.2 Device Status

Reporting Structure including Status Byte, Standard Event Registers, Questionable Registers, Operation Registers

Power

Power Supplies

Product Option	Platform	Memory	Voltage	Typical Current	Maximum Current	
ZT4611	PCI or PXI	Standard	+3.3 VDC +5 VDC +12 VDC -12 VDC	4.4 A 1.1 A 0.0 A 0.0 A	6.4 A 2.1 A 0.0 A 0.0 A	
		Extended	+3.3 VDC +5 VDC +12 VDC -12 VDC	4.9 A 1.1 A 0.0 A 0.0 A	7.2 A 2.1 A 0.0 A 0.0 A	
	VXI	Standard	+5 VDC +12 VDC +24 VDC -2 VDC -5.2 VDC -12 VDC -24 VDC	4.0 A 0.0 A 0.0 A 0.02 A 0.5 A 0.0 A 0.0 A	6.1 A 0.0 A 0.0 A 0.05 A 0.7 A 0.0 A 0.0 A	
		Extended	+5 VDC +12 VDC +24 VDC -2 VDC -5.2 VDC -12 VDC -24 VDC	4.4 A 0.0 A 0.0 A 0.02 A 0.5 A 0.0 A 0.0 A	6.7 A 0.0 A 0.0 A 0.05 A 0.7 A 0.0 A 0.0 A	
	LXI	Standard		115 VAC	0.22 A	0.33 A
		Extended		115 VAC	0.23 A	0.36 A
ZT4612	VXI	Standard	+5 VDC +12 VDC +24 VDC -2 VDC -5.2 VDC -12 VDC -24 VDC	7.1 A 0.0 A 0.0 A 0.02 A 0.8 A 0.0 A 0.0 A	10.9 A 0.0 A 0.0 A 0.05 A 1.2 A 0.0 A 0.0 A	
		Extended	+5 VDC +12 VDC +24 VDC -2 VDC -5.2 VDC -12 VDC -24 VDC	7.8 A 0.0 A 0.0 A 0.02 A 0.8 A 0.0 A 0.0 A	12.0 A 0.0 A 0.0 A 0.05 A 1.2 A 0.0 A 0.0 A	
	LXI	Standard		115 VAC	0.38 A	0.58 A
		Extended		115 VAC	0.42 A	0.64 A

ZT4211	PCI or PXI	N/A	+3.3 VDC +5 VDC +12 VDC -12 VDC	3.99 A 0.76 A 0.00 A 0.00 A	5.55 A 1.08 A 0.00 A 0.00 A
	VXI	N/A	+5 VDC +12 VDC +24 VDC -2 VDC -5.2 VDC -12 VDC -24 VDC	3.85 A 0.00 A 0.00 A 0.07 A 0.42 A 0.00 A 0.00 A	5.41 A 0.00 A 0.00 A 0.08 A 0.53 A 0.00 A 0.00 A
	LXI	N/A	115 VAC	0.27 A	0.28 A
ZT4212	VXI	N/A	+5 VDC +12 VDC +24 VDC -2 VDC -5.2 VDC -12 VDC -24 VDC	6.26 A 0.00 A 0.00 A 0.07 A 0.69 A 0.00 A 0.00 A	8.67 A 0.00 A 0.00 A 0.08 A 0.90 A 0.00 A 0.00 A
	LXI	N/A	115 VAC	0.37 A	0.42 A

Total Cooling & Power Consumption

Product Option	Platform	Memory	Typical Cooling & Power	Maximum Cooling & Power
ZT4611	PCI or PXI	Standard	20.3 W	31.5 W
		Extended	21.9 W	34.2 W
	VXI	Standard	22.5 W	34.2 W
		Extended	24.3 W	37.2 W
	LXI	Standard	25.0 W	38.0 W
		Extended	27.0 W	41.3 W
ZT4612	VXI	Standard	39.4 W	60.5 W
		Extended	43.0 W	66.5 W
	LXI	Standard	43.8 W	67.2 W
		Extended	47.8 W	73.9 W
ZT4211	PCI or PXI	N/A	17.0 W	24.0 W
	VXI	N/A	22.0 W	30.0 W
	LXI	N/A	31.0 W	34.0 W
ZT4212	VXI	N/A	35.0 W	48.0 W
	LXI	N/A	42.0 W	50.0 W

AC Power (LXI)

Line Voltage	90-264 VAC, 47-63 Hz, automatic selection
Input Protection	AC line fuse, 250 VAC, 2.0A, fast-acting
Harmonic Distortion	Meets EN61000-3-2
Surge Withstand	Meets EN61000-4
EMI Filtering	Meets CISPR 11 and 22 and FCC Part 15 Class B (conducted)

Physical

PCI Physical size	Single-Slot Short PCI Card
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PXI Physical size	Single-Wide 3U CompactPCI/PXI Instrument
VXI Physical size	Single-Wide C-size VXIbus Instrument
LXI Physical size	Half-Width 1U LXI Instrument
PCI Weight	1 lb. or 0.45 kg
PXI Weight	1 lb. or 0.45 kg
VXI Weight	3 lbs. or 1.4 kg
LXI Weight	4 lbs. or 1.8 kg

Temperature Range

Operating	ZT4610: 0 °C to +40 °C Ambient ZT4210: 0 °C to +50 °C Ambient
Storage	-40 °C to +75 °C
Over-Temperature	Automatic shutdown if internal temperature exceeds: +65 °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 +50 °C
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Altitude

Operating	Up to 2,000 m (ZT4610) Up to 3,000 m (ZT4210) Up to 5,000 m with Maximum Input (1 MΩ) of ±150 V (ZT4210)
Storage	Up to 15,000 m

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.

(Footnotes)

¹ Full-scale range assumes 10 divisions for vertical axis

² Magnification is used below 5 mV/div range. Full-scale range for accuracy specifications is defined as 50 mV

³ See ZTEC catalog for detailed specifications on all probes.

⁴ Rise time is calculated from $t_r = 0.35 / \text{bandwidth}$.

⁵ Horizontal time range assumes 10 divisions for horizontal axis

⁶ Sustained transfer rates are dependent upon host system configuration.

