GUZIK PRODUCT BULLETIN

8 Gbit/s

Read-Write Analyzer
RWA 4000

New

Works with GSA 6000 series digital signal analyzers

- Up to 8 Gbit/s maximum write data rate (RWA 4008 model)
- Pattern Generator with 1psec resolution of bit precompensation
- Universal servo decoder supports both Guzik servo and Hard Drive servo formats from all major hard drive manufacturers, including Chevron DTR servo
- PRML Chip integration using a daughter card with easy access through front panel
- Acoustic Emission sensor and Embedded HGA Contact sensor digitizing channels for TFC Touchdown detection
- All-digital low-pass filters
- Fast 120MByte/s PCI Express connection to host computer
- Space-saving 81mm low-profile package with reduced power consumption

Overview

RWA 4000 Read-Write Analyzer is a part of the new generation all-digital Guzik 4000 Series test systems. RWA 4000 requires Guzik signal analyzer GSA 6000 series to provide a complete RWA solution for magnetic recording test applications.

The RWA 4000 Read-Write Analyzer incorporates the following modules:

- Write channel, including Pattern Generator and Frequency Synthesizer modules
- Servo channel
- PRML channel
- Filter matrix

The RWA 4000 connects to the host computer via PCI Express 1x cable connection delivering 120 MByte/s sustained data transfer rates for faster operation.

The RWA 4000 comes in space-saving low-profile package with reduced power consumption. Optional 19-inch rack-mount installation kit is available.

Write Channel

RWA 4000 write channel includes a Pattern Generator and a Frequency Synthesizer module capable of writing patterns up to 8 Gbit/s in RWA 4008 model. Patterns are programmable – user-defined bit sequences can be loaded to pattern generator. One of the distinctive features of Guzik pattern generators is bit precompensation[1] with 1psec resolution.

Servo Channel

Servo channel includes the universal all-digital servo decoder. The decoder seamlessly supports both Guzik servo and Hard Disk Drive servo; switching between these two modes is done programmatically. The decoder is FPGA-based, which does not require a commercial PRML channel chip to decode hard drive servo, which makes it very flexible to support all major hard drive manufacturer servo formats including Chevron DTR servo.

PRML Channel

PRML Channel is arranged as a PRML Chip Adapter daughter card, accessible through RWA front panel. The card integrates a commercial PRML channel IC. Guzik integrates PRML channels from leading manufacturers upon request.

Filter Matrix

Programmable filter matrix of eight low-pass anti-aliasing filters with cutoff frequencies up to 3.2 GHz to provide data decimation for the data rates less than 8 GBit/s. Unlike previous generation of Guzik RWA 2000 and 3000 DTR series, you do not need to purchase filter or

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[1] US Patent 6,760,171

differentiator plug-in boards. Programmable filters of filter matrix combined with digital filters of GSA 6000 allow you to set any cut-off frequency of read channel.

AE and ECS Inputs

The RWA 4000 has two integrated low-frequency digitizing channels for processing signals from the following sensors:

- Acoustic Emission sensor (sensor on the cartridge), and/or

- Embedded Contact sensor (sensor on HGA).

The RWA 4000 system does not require an external digitizer box, such as PicoScope.

Analog Front-End

The RWA Systems 4000 Series support UP11 preamplifier and the next generation front end cartridge/headamplifier designs on Guzik Spinstands. Previous generation of head amplifiers together with UP10M are also supported by RWA 4000 Systems. Please note that you need UP10M modification 3 or 4 to connect to RWA 4000.

Digital Read Channel

All measurements are performed digitally by a separate GSA 6000 unit. For additional details please refer to the following Guzik product bulletins:

- *"GSA 6000 Series Guzik Signal Analyzers"* document P/N 02-107547,

- *"Read-Write Analyzer Systems 4000 Series"* document P/N 02-107536.

System Integration Requirements

- RWA System 4000 Series (RWA 4000 Series and GSA 6000)

- Guzik Spinstand DTR 3000, Guzik Spinstand V2002, Canon Spinstand, or HDD

- WITE32 Revision 4.40 or greater

- Windows-based host computer with two spare PCI-Express 16x slots to accommodate Guzik PCI-Express Bridge card and processing GPU card

RWA 4000 Specifications[*]

Write Channel / Pattern Generator	RWA 4004	RWA 4006	RWA 4008
Maximum Data Rate, Gbit/s	4	6	8
Minimum Bit Cell	250ps	167ps	125ps
Absolute Position Accuracy (for any transition, at max. data rate)	5 ps (typ) 10 ps (max)		
Precompensation Resolution (for any transition)	1 ps		
Jitter at max. data rate Random Pattern, RMS Repetitive Pattern, RMS	2 ps 2 ps		
Frequency Resolution	< 1 Hz		
Frequency stability	±2.5ppm up to 75°C, ±1ppm/year		
Random Pattern Maximum Length	256 Kbit (upgrade options exist)		

Analog Channel

Bandwidth	3.2 GHz @ –3dB
Flatness	±0.3 dB up to 2 GHz
Input Return Loss	10 dB to 3 GHz
Output Return Loss	16 dB to 3 GHz
Non-Linear Distortions	< 1.5 % (entire bandwidth, –10 dBm output level)
Rise/Fall Time	120 ps

Acoustic Emission Sensor Channels

Bandwidth	1 MHz @ –3dB
Sampling Rate	3 MSPS
Number of Channels	2

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[*] Specifications are subject to change without notice.

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Servo Channel

Analog Bandwidth	250 MHz
Sampling Rate	1 GSPS
Guzik Servo Decoder	Digital programmable decoder
Drive Servo Decoder	Digital programmable decoder; supports decoding of servo formats of all major hard drive manufacturers
Supported Servo Burst Modulations	Amplitude, Phase-change, and Chevron phase

PRML Chip Integration

Data Rate	Depending on commercial PRML chips
Supported PRML Chips	Chips from all major manufacturers are supported. New PRML chips can be integrated upon request.
PRML Channel Optimization	Supported by WITE software module

Physical

Size, W x D x H	17.5" x 15.8" x 3.2" 444 x 400 x 81 mm
Weight	12 lbs / 5.4 kg
Noise	25 dBa
Rack-Mount Installation Kit	Available
Power	110 VAC (± 10%, 50/60 Hz, 1A approx.) 230 VAC (± 10%, 50/60 Hz, 0.5A approx.)

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This product is protected by the following US Patents: 6,469,862; 6,760,171; 6,785,085; 7,221,220; 7,408,495.

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