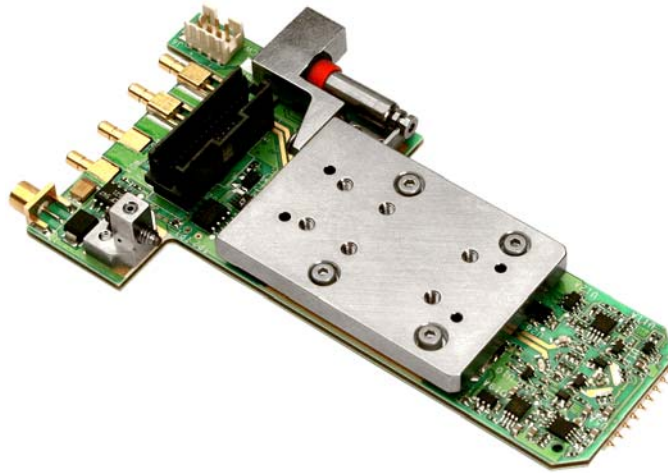


GUZIK PRODUCT BULLETIN

MR7 READ/WRITE AMPLIFIER



- **3 GHz Low-Impedance Current Sense Read Amplifier**
- **4 Gbit/sec Write Data Speed**
- **100 psec Rise/Fall Time of Write Current**
- **Programmable Width and Amplitude of Overshoot**
- **Write-to-Read and Read-to-Write Recovery Time below 100 nsec**
- **Programmable Heater Control**
- **Microactuator Support**

Guzik MR7 amplifier is designed for high-speed operation with RWA-2000 series. Compared with MR5 head amplifier, it has much wider bandwidth of write and read channels and significantly faster rise/fall time of write current. As a result, the MR7 can operate with data speed up to 4 Gbit/sec.

The output impedance of the MR7 write driver is 60 Ohm differential. The impedance can be changed per customer request to match a write-head specification. Since the read amplifier of the MR7 is a low-impedance current sense amplifier, the MR7 can work with both TMR and GMR types of magnetic heads.



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MR7 Read/Write Amplifier Specifications:

Write Driver

- **Write data speed:** up to 4Gbit/sec
- **Rise/fall time of write current (100% overshoot):** 100 psec (10-90%)
- **Output common mode voltage:** less than ± 0.1 V
- **Write current:** programmable 0 to 100 mA (zero to peak)
- **Read-to-write recovery time:** less than 100 nsec
- **Head voltage swing:** more than 12 V peak to peak
- **Programmable overshoot:**
 - Amplitude 0 to 100 mA (zero to peak)*
 - Width from 250 psec to 900 psec (PW50)
- **Output impedance:** 60 Ohm differential (contact sales@guzik.com for customer-requested output impedance)

Heater Driver

- **Single-ended or differential output configurable on the board upon customer request**
- **Output voltage:** from 0 to 12 V (*peak to peak, typical, adjustable upon customer request*)
- **Accuracy of output voltage setting:** ± 10 mV
- **Output current:** up to 125 mA in 0.1 mA steps
- **Accuracy of current measurements:** ± 0.2 mA
- **Two types of heater voltage control:**
 - Internal control** (via 16 bit DAC) separate in the read and the write mode
 - External control** (through MCX connector) with input range from 0 to 3 V and amplification 2 (*typical, adjustable upon customer request*)
- **Heater impedance:** 50 Ohm or higher
- **Rise/Fall time:** 100 nsec (defined by 4 MHz internal low-pass filter)
- **Resistance measurements**

Read Amplifier

- **Differential current sense low-impedance amplifier**
- **Bandwidth:** DC to 3GHz at -3 dB
 - Flatness ± 0.5 dB, 0.3 MHz to 2 GHz
 - Group delay flatness ± 50 psec to 2 GHz
- **Input noise:** $1.0 \text{ nV} / \sqrt{\text{Hz}}$ (*typical*)
- **MR bias voltage:** programmable ± 400 mV in 0.1 mV steps
- **MR Head Impedance:** up to 1000 Ohm
- **MR impedance measurement accuracy:** 1% within the bias voltage range (20 mV to 400 mV)
- **Common mode rejection ratio:** 24 dB (*typical*) in full bandwidth (18 dB minimum at 700 MHz)
- **Non linear distortion (1 GHz, 1 mV input level):** less than 1%
- **Amplification:** 30 dB**
- **Write-to-read and read-to-write recovery time:** 100 nsec (*typical*) for both Bias On and Shut Down Bias modes***
- **Input impedance:** 80 Ohm differential (*typical*)
- **Guzik MR7 head amplifier compatibility:** with Universal Preamplifier UP10 only.

Microactuator

Single-ended or differential output configurable on the board upon customer request

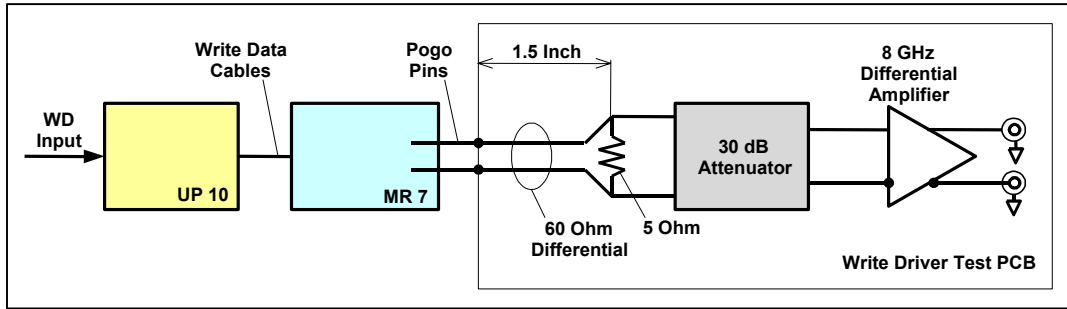
* *Write current should not exceed 100 mA (zero to peak) for any overshoot value*

** *Required amplification is provided by UP10*

*** *Measurements conditions: write current 50 mA, head inductance 5 nH, write data 1 Gbit/sec*



MR7 Write Driver Test Setup



Write Current Waveform

Measurement Conditions: write current 50 mA, overshoot amplitude 100%, head equivalent 5 Ohm.

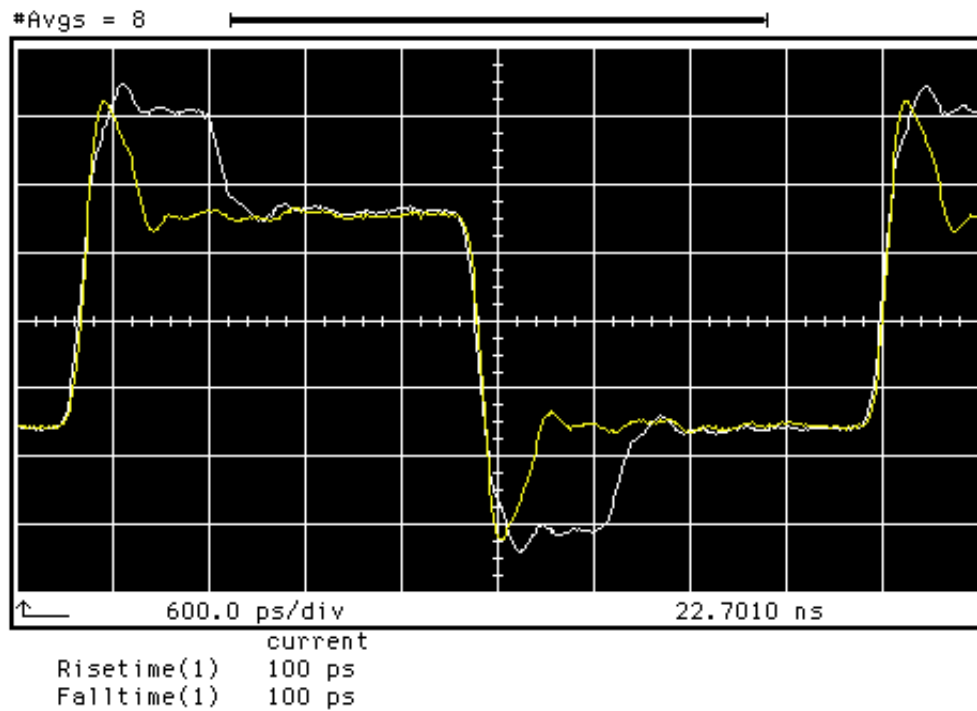


Figure 1: Write current with the minimum and the maximum overshoot width

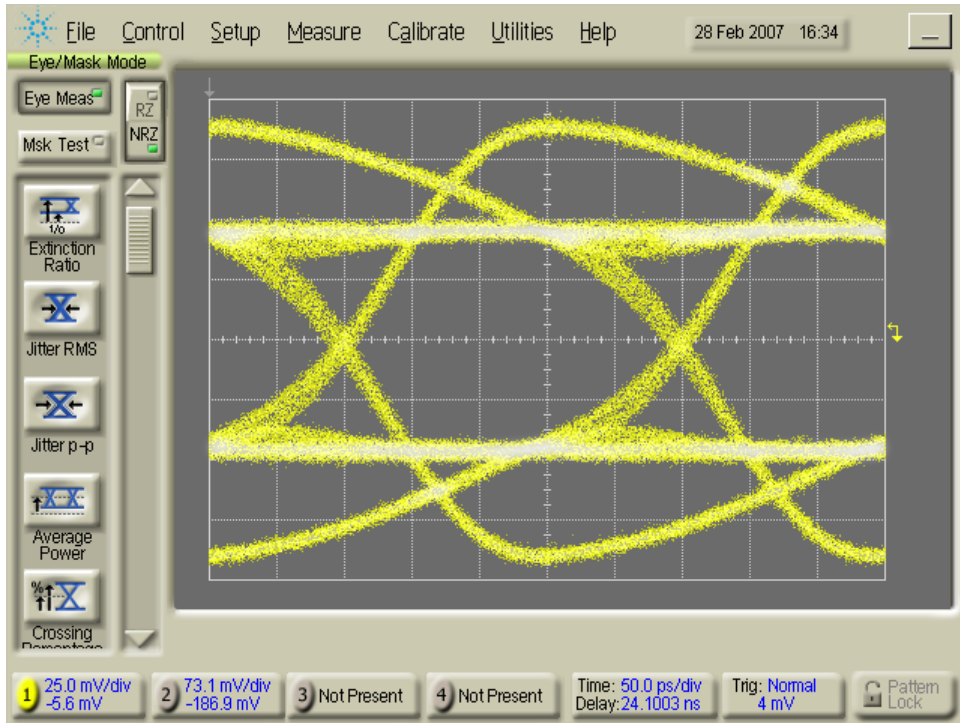


Figure 2: Write current eye diagram at 4 Gbit/sec, pattern PRBS $1+x^8+x^4+x^3+x^2$, 100% overshoot, overshoot width 250 psec

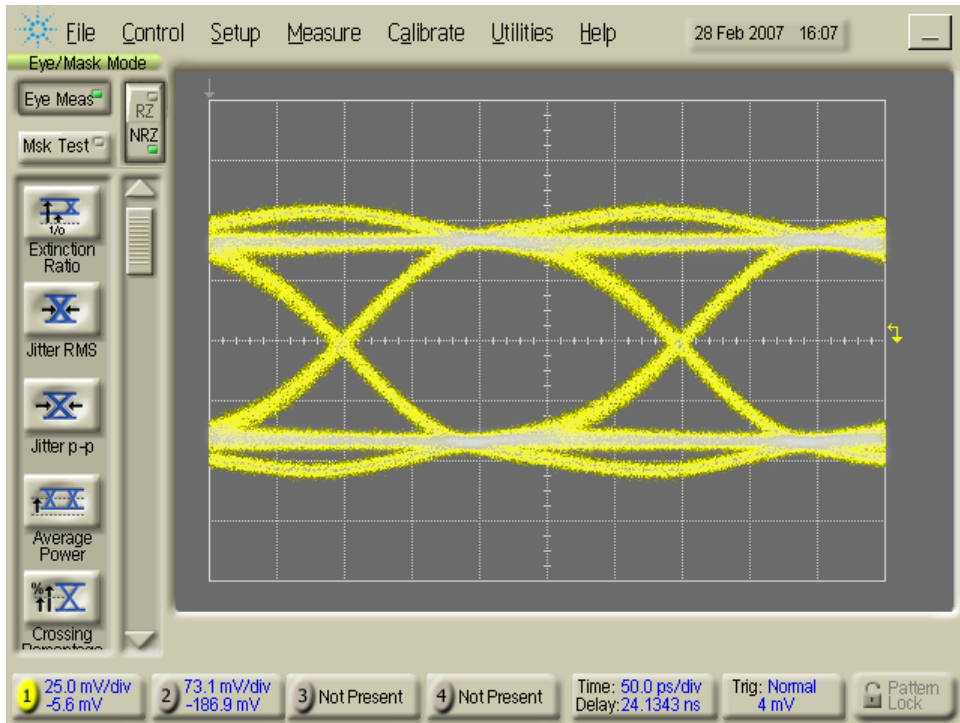


Figure 3: Write current eye diagram at 4 Gbit/sec, pattern PRBS $1+x^8+x^4+x^3+x^2$, no overshoot