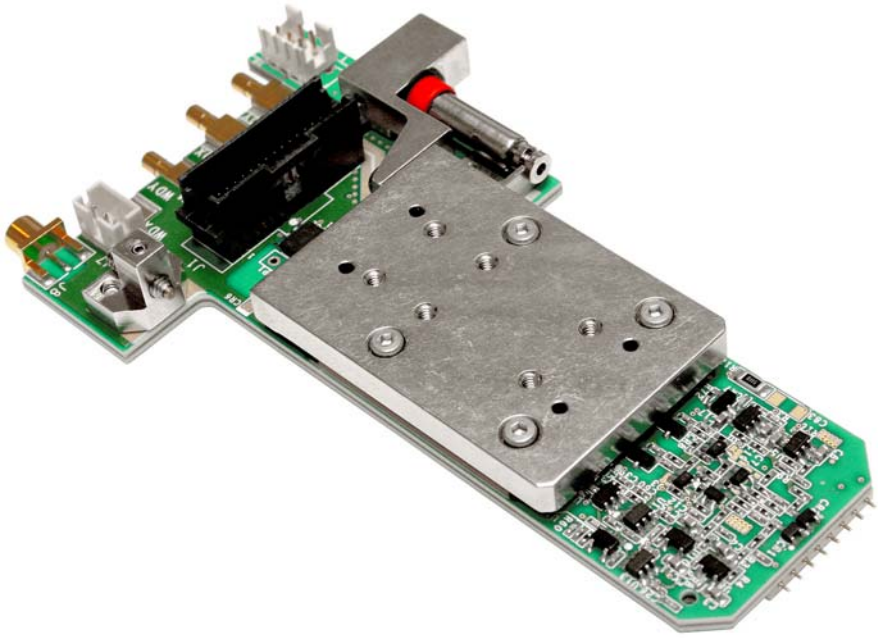
GUZIK PRODUCT BULLETIN

MR-5 READ/WRITE AMPLIFIER FOR GMR HEADS

2Gbit/sec Write Data Speed
1.5GHz Read Amplifier Bandwidth



The Guzik MR Amplifier Revision 5 is a next generation of the Guzik head amplifiers. The main advantages of the Guzik MR Amplifier Revision 5 comparing to the Revision 4 are:

- **Fast rise/fall time of the write current (300psec instead of 800psec)**
- **Programmable overshoot of the write current up to 100%**
- **High bandwidth of the read amplifier (1.5GHz instead of 400MHz)**
- **Small write to read recovery time (less than 200nsec comparing to 2μsec)**
- **Supports heater (single-ended or differential)**
- **Microactuator compatible**

GUZIK
Technical Enterprises

2443 Wyandotte Street
Mountain View, CA 94043
Phone: (650) 625-8000
Fax: (650) 625-9325
E-mail: sales@guzik.com
http://www.guzik.com/

Rev. 09/08/2006 Guzik Part Number: 02-105546-07

MR Amplifier Revision 5 Specifications:

Read Amplifier

- **Differential voltage sense amplifier**
- **Bandwidth:** 1.5GHz at –3dB
- **Flatness:** ±0.5dB, 0.3 to 1GHz
- **Input noise:** less than 0.6 $nV/\sqrt{Hz}$ (typ.)
- **MR bias current:** programmable –5 to +5mA* in 0.01 mA steps
- **Common mode rejection ratio:** TBD
- **Non-linear distortions (1GHz, 1mV input level):** less than 1%
- **Amplification:** 30dB**
- **Write to read recovery time:** less than 200nsec for both *Bias On* and *Shut Down Bias* modes***
- **Input impedance:** at 1GHz TBD
- **Guzik MR5 head amplifier compatibility:** with Universal Preamplifier UP8 only.
- **MR head impedance range:** 20-100Ohm

Write Driver

- **Write data speed:** up to 2Gbit/sec
- **Rise/fall time of write current:** (10-90%) 300psec****
- **Programmable overshoot :** up to 100% of write current in 1% steps
- **Output common mode voltage:** less than ±0.1V
- **Write current:** programmable 2 to 100mA (zero to peak) in 0.02mA steps*****
- **Read to write recovery time:** less than 40nsec
- **Head voltage swing:** more than 12V peak to peak
- **Output impedance:** 100Ohm differential

* The MR bias current is limited in hardware to protect the GMR element of magnetic head. Some customers are using the modification with ±20 mA MR bias current.

** Required amplification is provided by UP8.

*** Measurements conditions: write current 50mA, head inductance 20nH, and write data 1Gbit/sec.

**** Measurement conditions: write current 50mA, 100% overshoot, L=20nH in series with R=20 Ohms, current probe Tektronix CT-6.

***** Maximum overshoot value in 50-80mA write current range should be calculated as I overshoot + I write = 100mA.

Heater Features:

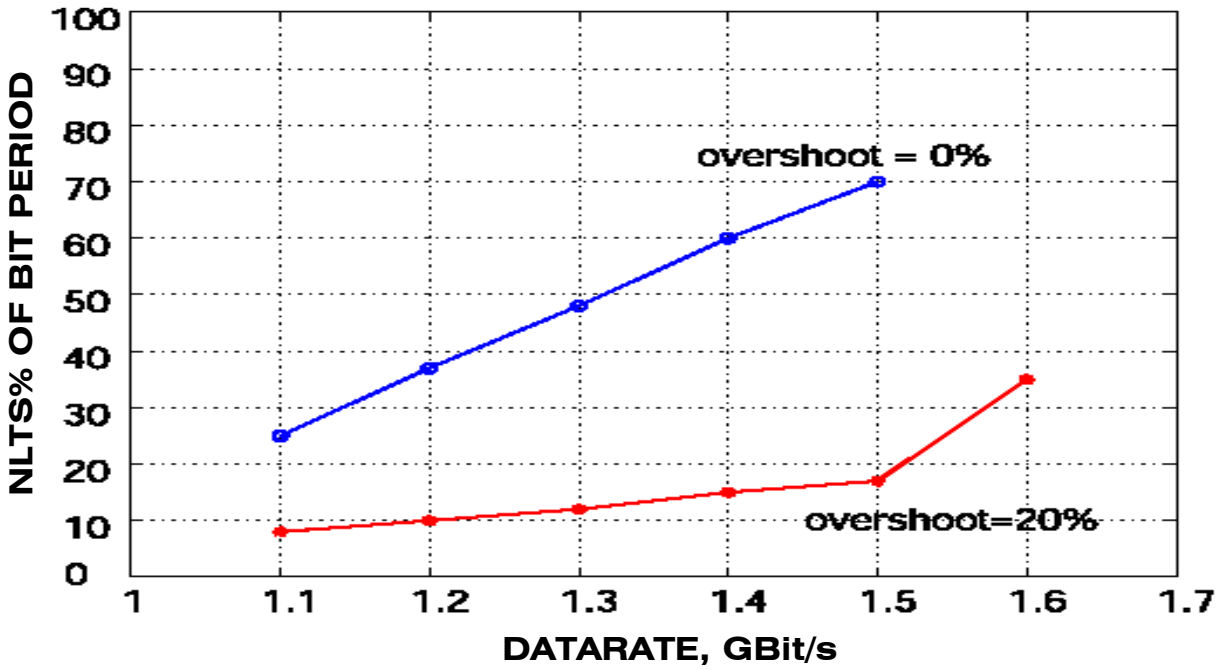
Single-ended heater

- **Output heater voltage:** from 0 V to 5 V
- **Maximum output current:** 250 mA
- **Two types of heater voltage control**
  Internal: one setting for the read mode and the write mode by one DAC
  External (MCX connector): input range from 0 V to 5 V, low-pass filter with 4 MHz cut-off frequency
- **Rise/fall time for external control:** 100 nsec
- **Heater current and voltage measurements:** Current measurement accuracy ±1.0 mA
  Voltage measurement accuracy ±5.0 mV

Differential heater

- **Output heater voltage:** from 0 V to 7 V
- **Max output current:** 70 mA
- **Internal voltage control only, separate controls – one DAC for the read mode and one DAC for the write mode**

NLTS vs Data Rate



Write Current Waveform

Measurement Conditions

- **write current: 50mA**
- **overshoot amplitude: 0 to 100%**
- **head equivalent: 20nH + 20 ohms**

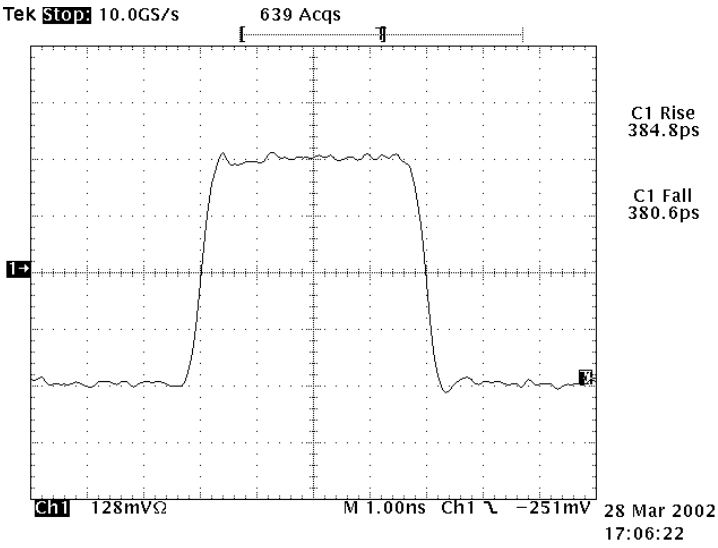


Figure 1A: Write Current, Overshoot 0%

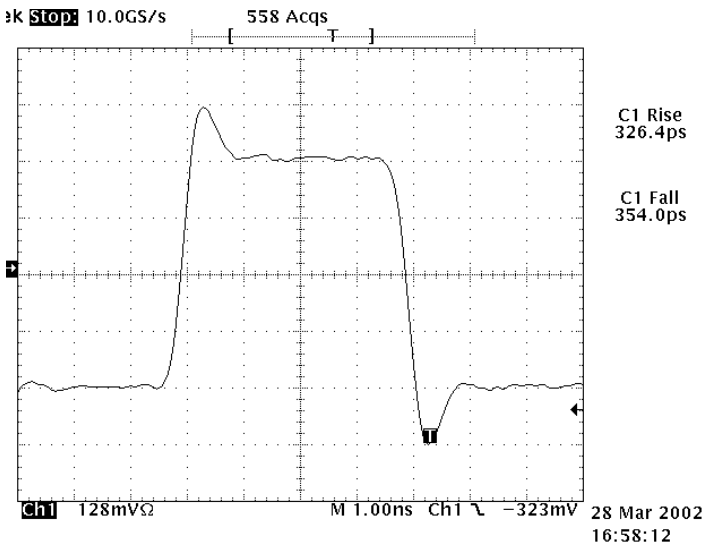


Figure 1B: Write Current, Overshoot 50%

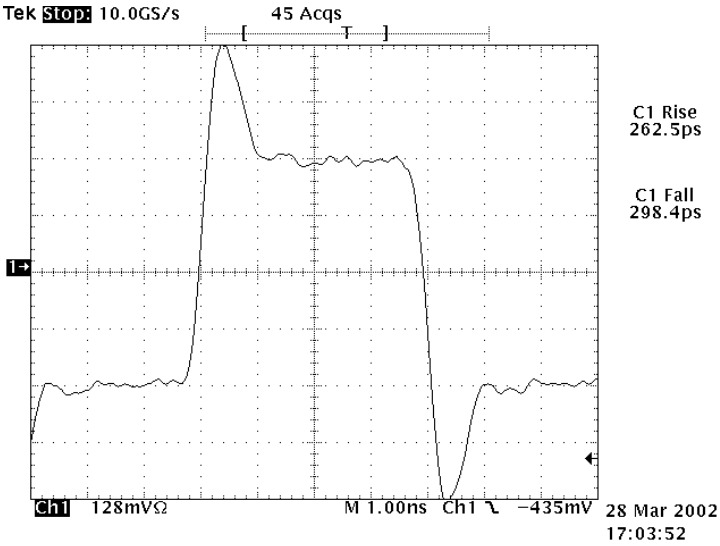


Figure 1C: Write Current, Overshoot 100%

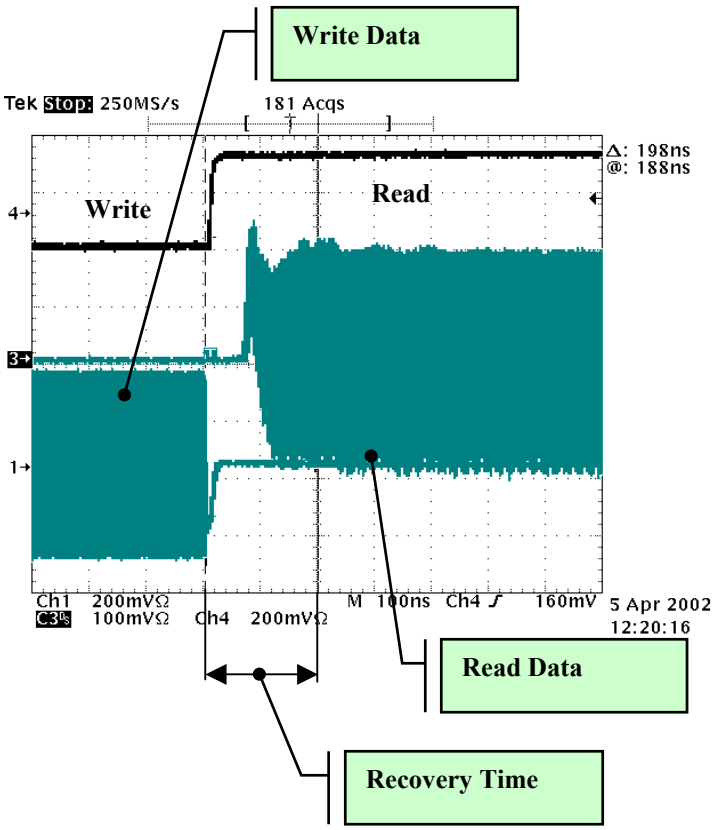


Figure 2A: Write to Read Recovery (Bias On)

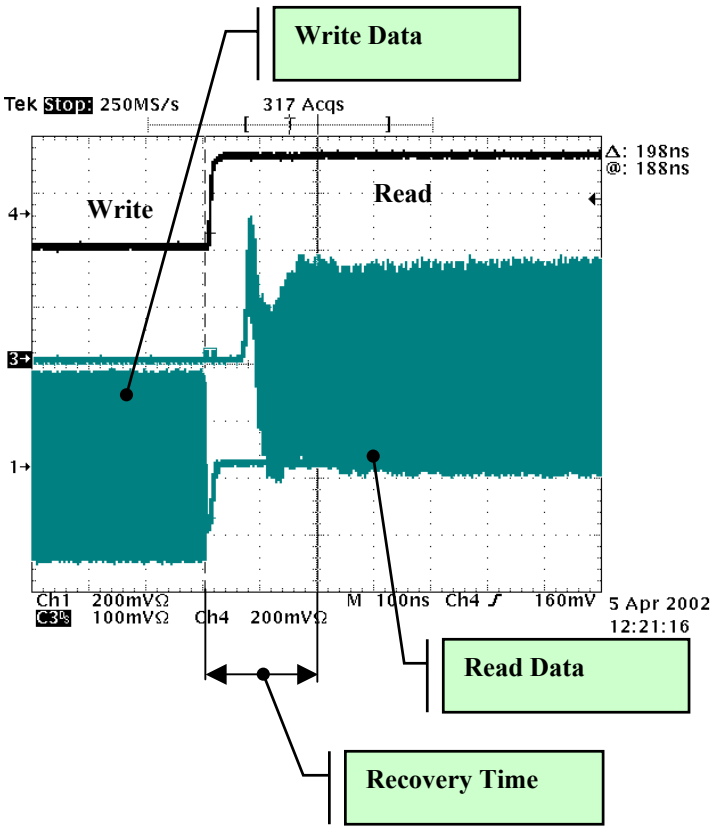


Figure 2B: Write to Read Recovery (Bias Shut Down)

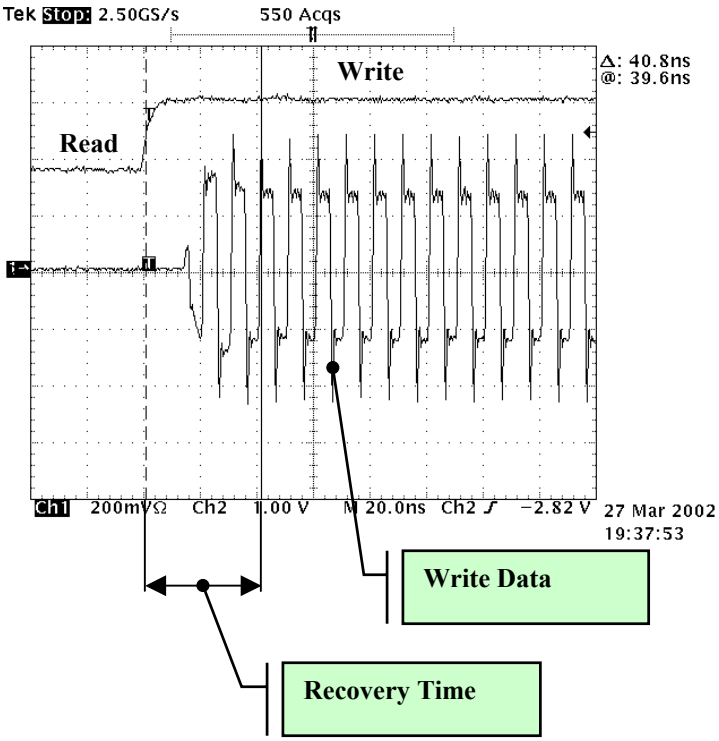


Figure 2C: Read to Write recovery