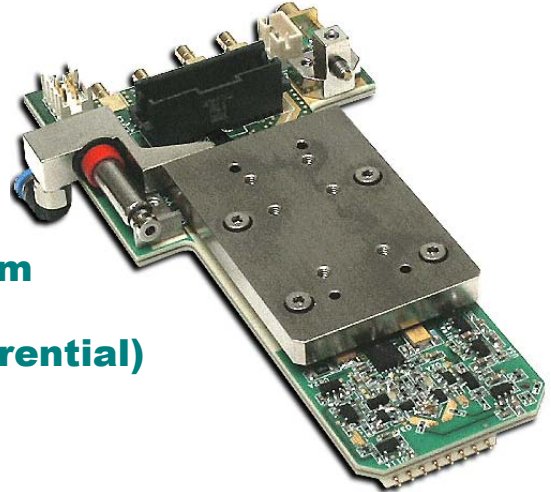


GUZIK PRODUCT BULLETIN

MR-5L CURRENT-SENSE LOW-IMPEDANCE READ AMPLIFIER FOR TMR HEADS*

- **Bandwidth from DC to 2 GHz**
- **Writer driver 2 Gbit/sec**
- **Head impedance from 100 to 1000 Ohm**
- **Supports heater (single-ended or differential)**
- **Microactuator compatible**



The *Guzik MR-5L* read amplifier is designed to work with the high-impedance TMR heads. The impedance of such heads can be as high as *1000 Ohm*, so it is impossible to achieve a high bandwidth with a high-impedance amplifier. This is the reason, why *MR-5L* is a current-sense low-impedance amplifier with voltage bias. The MR-5L also incorporates a heater driver and supports connection to a microactuator on a head suspension in order to perform the mechanical and electrical tests of the microactuator. The Guzik high-impedance injector (passive or active) is recommended for the calibration or the performance measurements of the MR-5L.

MR Amplifier 5L Specifications:

Read Amplifier

- **Differential current sense low impedance amplifier**
- **Bandwidth:** DC to 2GHz at -3 dB
- **Flatness:** ± 0.5 dB, 0.3 MHz to 1 GHz
- **Input noise:** $1.0 \text{ nV} / \sqrt{\text{Hz}}$ (typical)
- **TMR bias voltage:** programmable ± 400 mV in 0.1 mV steps
- **TMR impedance measurements accuracy:** 1% within the bias voltage range (20 mV to 400 mV)
- **Common mode rejection ratio:** 24 dB (typical) in full bandwidth (worst 18 dB at 700 MHz)
- **Non linear distortion (1 GHz, 1 mV input level):** less than 1%
- **Amplification:** 30 dB**
- **Write to read recovery time:** 100 nsec (typical) for both Bias On and Shut Down Bias modes***
- **Input impedance:** 80 Ohm differential (typical)
- **Guzik MR5L head amplifier compatibility:** with Universal Preamplifier UP8 only.

* US Patent 7,061,321 B1, Patent pending in Japan

** Required amplification is provided by UP8

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

Write Driver (General Specification)*

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

* MR-5L comes with Guzik Write Driver Revision 5 (for more details see the bulletin "Guzik Read/Write Amplifier Revision 5").

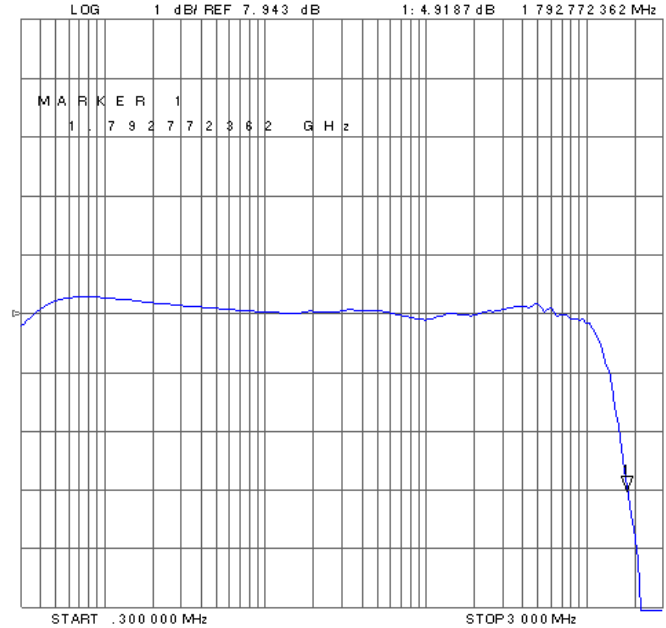
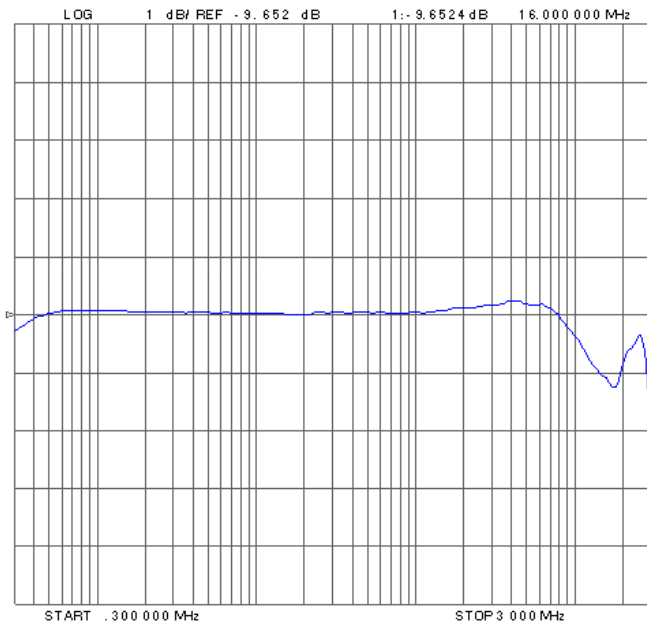
** Measurement conditions: write current 50 mA, 100% overshoot, and $L=20$ nH in series with $R=20$ Ohm; current probe Tektronix CT-6.

*** Maximum overshoot value in write current range 50-100 mA should be calculated according with formula $I_{\text{overshoot}} + I_{\text{write}} = 100$ mA.

Heater Features:

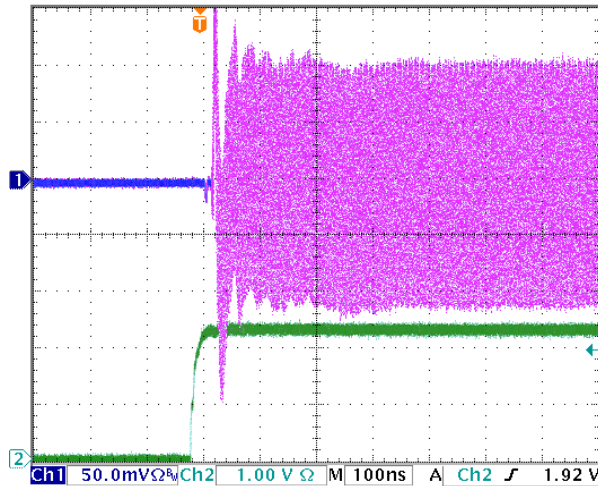
- **Single-ended or differential output configurable on the board upon customer request**
- **Output heater voltage:** from 0 to 9 V (*typical, adjustable upon customer request*)
- **Two types of heater voltage control:**
 - Internal:** with separate control in the read and write modes by an internal DAC
 - External (through MCX connector):** input range from 0 to 4 V, amplification 2.5 (*typical, adjustable upon customer request*)
- **Heater impedance:** not less than 50 Ohm.
- **Rise/Fall time:** 100 nsec (defined by 4 MHz low pass filter)
- **Heater current and voltage measurements:** Current measurement accuracy ± 1.0 mA
Voltage measurement accuracy ± 5.0 mV
- **Maximum output current:** 125 mA

MR-5L Frequency Response



Measurement Conditions: high-impedance injector,
MR-5L only (Left), MR-5L with Guzik Universal Preamplifier 8 (Right)

MR-5L Write-to-Read Recovery Time



Measurement Conditions:

- Write data 200 Mbit/sec
- Write current 50 mA
- High-impedance injector

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/>