



**SIGNAL PROCESSING
COMPONENTS**

(4+4) MR PREAMP and TF WRITE DRIVER

IMP49P504

Description

The IMP49P504 is a combination four-input magneto-resistive pre-amplifier and four-output thin film write driver. It is ideally suited for mass storage applications utilizing advanced MR head technology, such as hard disk and tape drives.

The IMP49P504 can operate in either a read or write mode.

During the read mode the write current is disabled.

The pre-amplifier can be used with read and servo carrier signals. The preamp input stage provides bias current for the magneto-resistive elements. Current is sourced from the single-ended input pins into the MR element while amplifying the AC signal generated across the element. The bias current is set by an external resistor to ground.

The write driver is implemented in an H-bridge configuration for non-center-tapped thin film elements. A four-channel differential output multiplexor is used. The outputs are allowed to swing up to 7 volts above VSS, thus improving switching time. Write current is set by an external resistor to ground.

The write driver is totally disabled for low or non-valid values of VDD, such as during device power-up or power-down. A Write-Un-Safe indicator pin is provided.

The IMP49P504 is implemented in IMP's proprietary BiCMOS 1.2µm process.

Feature Summary

PRE-AMPLIFIER

- 4 channels
- 70MHz BW
- MR element biasing
- Current bias & current sense scheme
- Single-ended input, differential output
- Resistor programmable MR bias current
- MR voltage clamp protection

WRITE DRIVER

- 4 channels
- 45MT/s
- H-bridge configuration
- Power supply fault detection
- Non-center-tapped thin film element
- Integrated damping resistors
- Resistor programmable write current

SYSTEM

- Single +5V supply
- Power-down mode
- 32 pin TQFP





Pin Description

NAME	DESCRIPTION
VDD	+5V supply
VSS	Ground
RDX, RDY	Pre-amplifier differential outputs.
IDLE	A low level disables preamp bias current for the MR element and the write driver current.
R/W	Read/Write mode select. A high level selects read mode. An internal pull-up provides write protection if the connection to this input is lost.
PD	Power-down mode select. A high level places chip in low-power sleep mode.
WDP, WDN	Write Data differential input. Changes direction of write current in recording head. (PECL)
HS0, HS1	Head Select address. Both inputs low selects head 0.
WUS	Write UnSafe output. A high level indicates that an unsafe condition of the supply has been detected. Output is forced high during PD mode.
RW	Write current pin. A resistor is connected between this pin and ground to set the write current (IW).
RB	Bias current pin. A resistor is connected between this pin and ground to set the MR bias current (IB).
MR0, MR1, MR2, MR3	MR element single-ended input / bias current.
MRG	MR element ground connection pin.
WR0P, WR0N WR1P, WR1N WR2P, WR2N WR3P, WR3N	Outputs for driving thin-film non-center-tapped write elements.
C1, C2, C3	Noise decoupling nodes using external capacitors.





Absolute Maximum Ratings ⁽¹⁾

Parameter	Conditions	Min	Nom	Max	Units
Supply voltage	VDD-VSS	0		7.0	V
Voltage on any input	Min relative to VSS Max relative to VDD	-0.3		+0.3	V V
Storage temperature		-65		150	°C

⁽¹⁾ Stresses above the Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other condition above those indicated in the operational sections of the specifications is not implied.

Recommended Operating Conditions

Parameter	Conditions	Min	Nom	Max	Units
Supply voltage	VDD-VSS	4.5	5.0	5.5	V
Ambient operating temperature		0	25	80	°C



DC Characteristics

(unless otherwise specified, recommended operating conditions apply)

Parameter	Condition	Min	Nom	Max	Units
Power supply current	Read Mode (IB + 10mA) Write Mode (IW + IB + 30mA) Sleep Mode		20 88	22 92 0.5	mA mA mA
High level input voltage	TTL inputs only	2.0			V
Low level input voltage	TTL inputs only			0.8	V
High level output voltage	TTL outputs only, I _{OH} = -2mA	2.4			V
Low level output voltage	TTL outputs only, I _{OL} = 3.2mA			0.4	V
High level differential input voltage	WDP, WDN inputs only; PECL	VDD -1.0		VDD -0.7	V
Low level differential input voltage	WDP, WDN inputs only; PECL	VDD -1.9		VDD -1.6	V
VDD voltage fault detection	Under-voltage threshold	3.0		4.0	V
R/ \bar{W} pull up resistance			10		k Ω
Bias resistance (RB)			2.0		k Ω
Bias current range (IB)		8		12	mA
IB tolerance				10	%
Write resistance (RW)			2.0		k Ω
Write current range (IW)		25		50	mA
IW tolerance				10	%



AC Characteristics

(unless otherwise specified, recommended operating conditions apply)

Parameter	Conditions	Min	Nom	Max	Units
Preamp voltage gain	MR resistance = 22Ω	42	44	46	dB
Preamp -3dB BW	C _{load} on RDX, RDY <15pF	70			MHz
Preamp low corner cutoff frequency				250	kHz
Preamp input referred noise	Measured at 5MHz, MR resistance = 22Ω, IB = 10mA, MR noise subtracted		0.8		nV _{RMS} /√Hz
Preamp power supply rejection	Measured at 5MHz, referred to input at nominal gain of 44dB	55	60		dB
Preamp output impedance	Read mode (<50MHz) Non-read mode	1		50	Ω MΩ
Write transition rate				45	MT/s
Write current rise/fall time	10%-90% points, RH = 20Ω, LH = 280nH			6	ns
Write current rise/fall time asymmetry	10%-90% points, RH = 20Ω, LH = 280nH			500	ps
Read to write mode settling time	Delay to 90% of write current			125	ns
Write to read mode settling time	Delay to 10% of 10MHz read signal envelop or decay to 10% of write current.			1	μs
Head select settling time	Delay to 10% of 10MHz read signal envelop.			10	μs
Sleep (PD = 1) to Read/Write time (PD = 0, IDLE = 1)				300	μs
Idle (PD = 0, IDLE = 0) to Read/Write time (PD = 0, IDLE = 1)				10	μs
Allowable write output voltage swing during switching	Relative to VSS			7	V



