

Teledyne Electronic Technologies

TETMD A110-1/2**

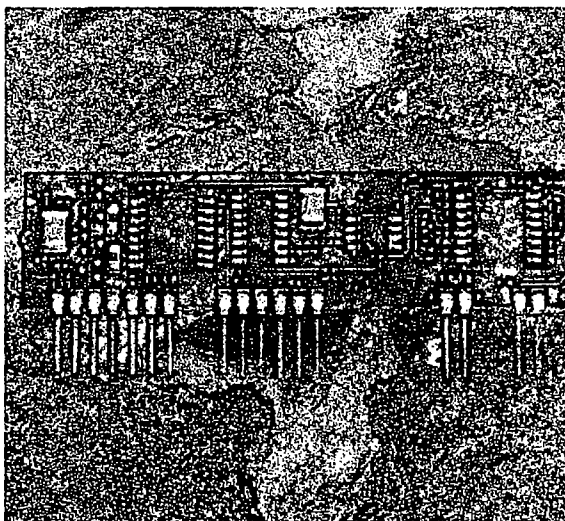
Dual Channel Amplifier/Filter

Medical Signal Processing Amplifier

Description

The TETMD A110-1/2 is a complete, compact, ultra low power, analog signal processing amplifier module. It contains all the necessary signal conditioning elements for processing many different biological signals.

The TETMD A110-1/2 has two independent amplifier channels, each one consisting of: instrumentation amplifier, antialiasing low pass filter, programmable high pass filter, programmable gain amplifier, and output buffer. Each amplifier has three gain and two filter settings.



Picture Not to Scale

Features

- Dual Independent Channels
- Compact Size 3 x 0.75 x 0.25 Inches
- 900 μ A Per Channel
- Gain: .5K, .67K, 1K, & 2K for A110-1*
.9K, 1K, 5K, & 10K for A110-2*
- Input Impedance: >1000 M Ohms
- Common Mode Rejection Ratio: >100 dB
- High Pass Filters: 0.3* & 0.5* Hz
- No External Components Required for Signal Conditioning
- Easy Connection and Application

* Other Values are Available

Applications

- Analog Signal Conditioning for Bioelectrical Signals
- DSP Analog Signal Processing Amplifier
- EEG Amplifier
- EMG Amplifier
- EOG Amplifier
- EKG Amplifier
- Respiration Amplifier
- Oxygen Sensor Amplifier
- Strain Gauge Amplifier
- Biomedical Signal Ambulatory Recorders

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Absolute Maximum Ratings:

Total Supply Voltage (V_{CC+} to V_{CC-}) 30 V
 Total Supply Voltage (V_{EE+} to V_{EE-}) 30 V
 Input Voltage + 0.4 to - 0.4 V

Test Conditions:

$V_{CC} = \pm 15V$, & $V_{EE} = \pm 5V$, Room Temperature, unless otherwise specified

Tolerance:

$\pm 5\%$ on all measurements, unless otherwise specified

Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Units	Notes
Gain					
Programmable Gain Range		.5K, 67K, 1K & 2K			A110-1
Programmable Gain Range		.9K, 1K, 5K & 10K			A110-2
Gain Error		1	3	%	
Input					
Bias Current ¹		10		pA	
Noise ¹		0.5	2	μV_{p-p}	0.1 to 10 Hz
Input Impedance ¹	100 M	1.0 G		Ohms	
Common Mode Rejection Ratio	90	100		dB	@ 60 Hz
AC Input Dynamic Range	1		5000	μV_{p-p}	
Maximum Electrode DC Offset			500	mV_{p-p}	
Filters					
6 th Order Bessel Low Pass Filter f -3dB		75		Hz	
1 st Order High Pass Filter f -3dB		0.3 0.5		Hz	Digitally Programmable
Power Supply					
V_{EE} Supply Voltage	± 5	± 5	± 18	V	
V_{CC} Supply Voltage	± 5	± 15	± 18	V	
V_{EE} Quiescent Current		± 300	± 500	μA	@ $\pm 5 V_{DC}$
V_{CC} Quiescent Current		± 750	± 1000	μA	@ $\pm 15 V_{DC}$
Digital Supply Voltage	4.5	5	5.5	V	Control Signal Voltage Level
Temperature Range	0		+50	$^{\circ}C$	Extended temperature range is available as a special order

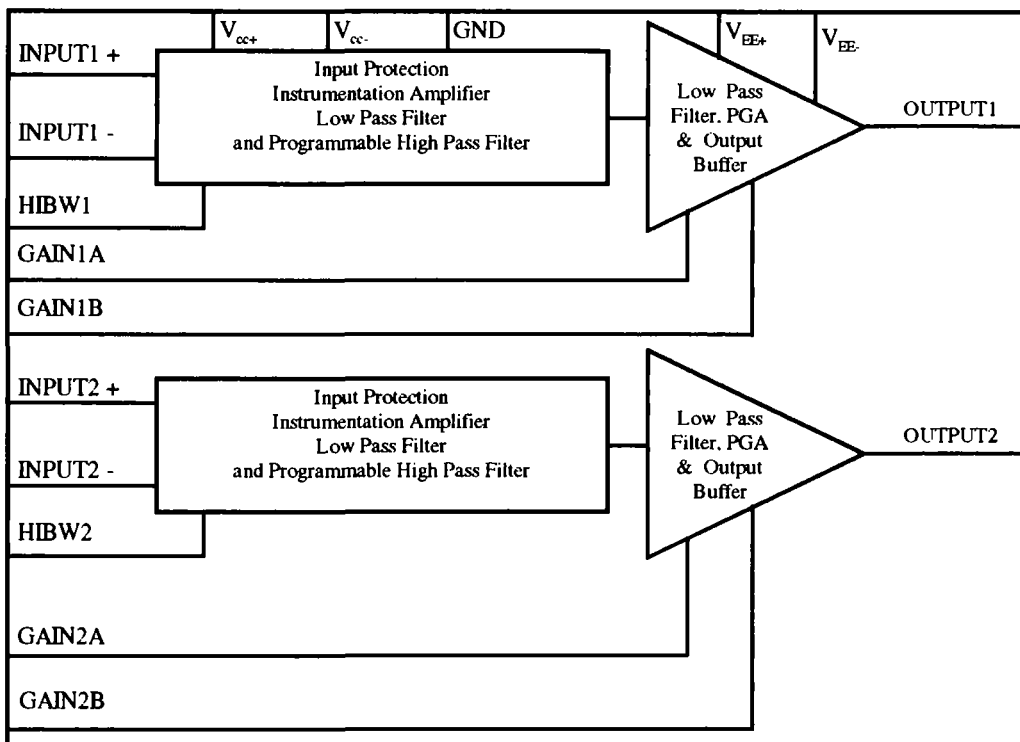
1. These numbers are guaranteed by design and/or characterization

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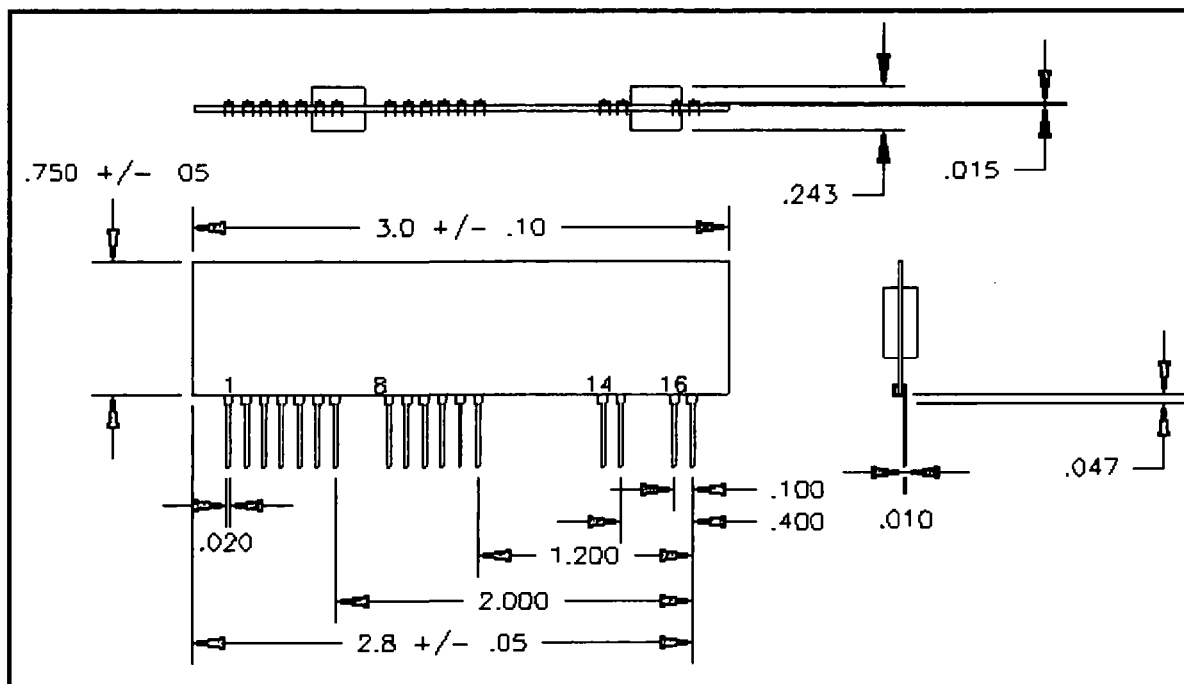
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Block Diagram



Physical Dimensions (Inches)



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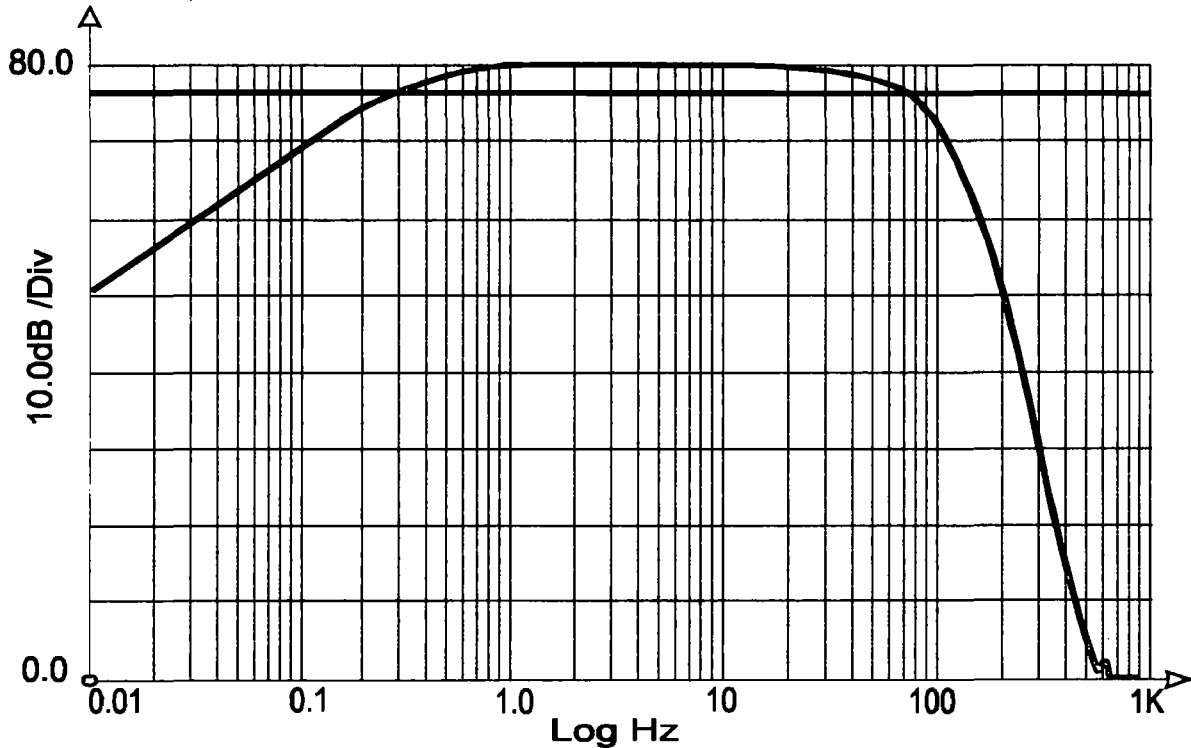
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Pin Assignment

Pin	Name	Description	Pin	Name	Description
1	INPUT1-	Channel #1 Input -	10	Gain2A	Second Amplifier Low Bit Gain Select
2	INPUT1+	Channel #1 Input +	11	Gain2B	Second Amplifier High Bit Gain Select
3	INPUT2+	Channel #2 Input +	12	HIBWA1	First Amplifier High Pass Filter Select
4	INPUT2-	Channel #2 Input -	13	HIBWB2	Second Amplifier High Pass Filter Select
5	AGND	Analog Power Supply Ground	14	-V _{EE}	Amplifier/Filter - Power Supply
6	+V _{CC}	Pre Amplifier + Power Supply	15	+V _{EE}	Amplifier/Filter + Power Supply
7	-V _{CC}	Pre Amplifier - Power Supply	16	OUT1	Channel # 1 Output
8	Gain1A	First Amplifier Low Bit Gain Select	17	OUT2	Channel # 2 Output
9	Gain1B	First Amplifier High Bit Gain Select			

Frequency Response

(for TMD A110-2)



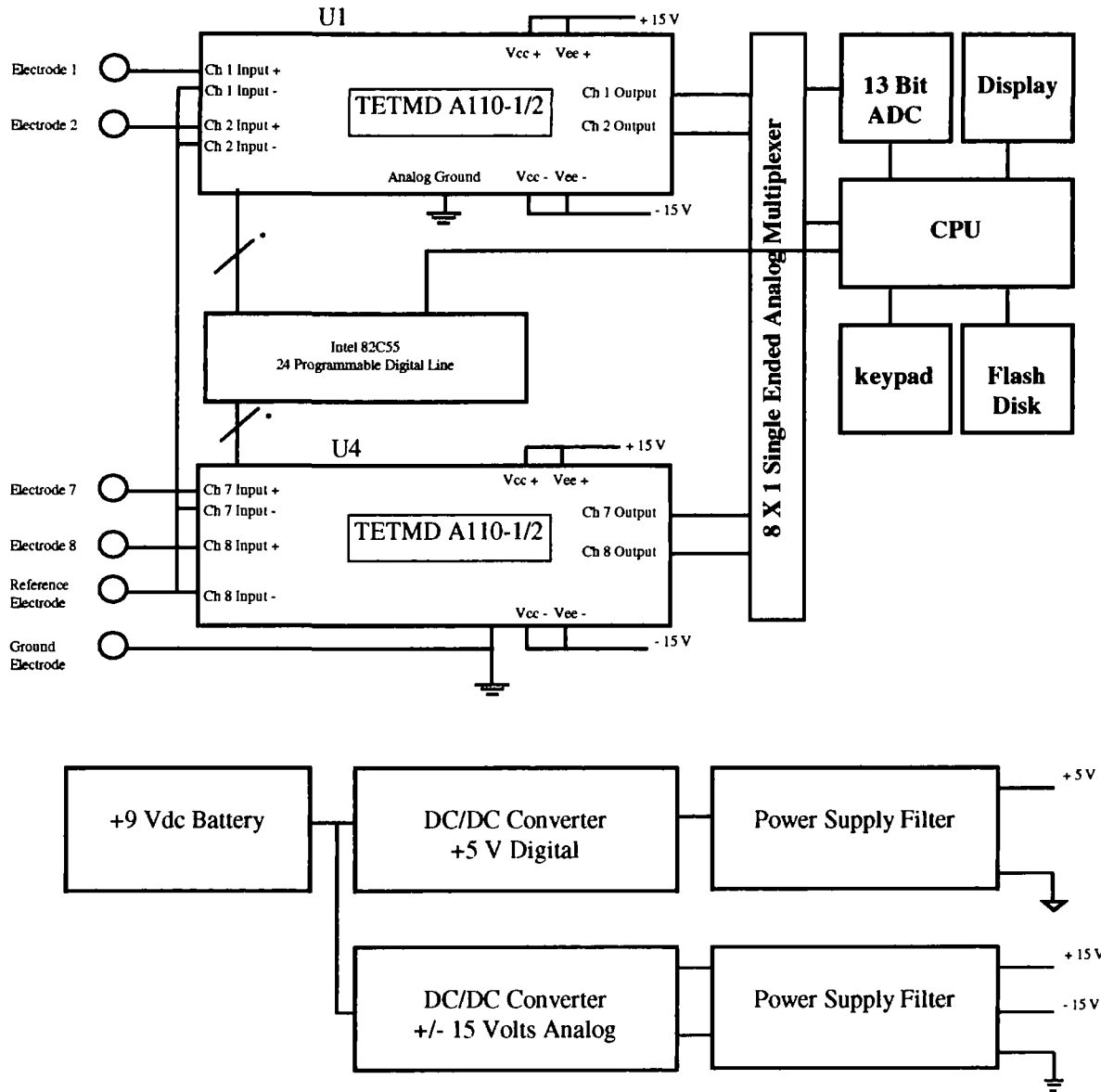
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Application Note

8 Channel Biological Signal Solid State Recorder



For more information please visit our WEB site:

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PUBMED

Gain Setting Logic

TET-MD A110-1

PGA Control 1	PGA Control 2	GAIN
0 V _{DC} (OFF)	0 V _{DC} (OFF)	500
5.0 V _{DC} (ON)	0 V _{DC} (OFF)	670
0 V _{DC} (OFF)	5.0 V _{DC} (ON)	1,000
5.0 V _{DC} (ON)	5.0 V _{DC} (ON)	2,000

TET-MD A110-2

PGA Control 1	PGA Control 2	GAIN
0 V _{DC} (OFF)	0 V _{DC} (OFF)	900
5.0 V _{DC} (ON)	0 V _{DC} (OFF)	1,000
0 V _{DC} (OFF)	5.0 V _{DC} (ON)	5,000
5.0 V _{DC} (ON)	5.0 V _{DC} (ON)	10,000

Filter Setting Logic

Control	High Pass Filter
0 V _{DC} (OFF)	0.5 Hz
5.0 V _{DC} (ON)	0.3 Hz

Note:

Part Number	Description
TETMD A110-1	Same as TETMD A110-2 except Gain Values are 500; 670; 1,000; & 2,000

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