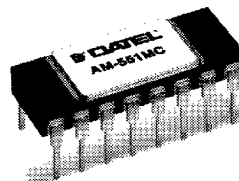


FEATURES

- 1 to 50 gain range
- $\pm 0.01\%$ maximum nonlinearity
- $3\mu\text{s}$ settling time
- 100dB CMRR
- 600kHz small signal bandwidth
- Resistor and pin programmable



GENERAL DESCRIPTION

DATEL's AM-551 is a high-performance, programmable-gain instrumentation amplifier manufactured with hybrid thin-film technology. Gain is adjustable over a range of 1 to 50 with a single external resistor and a simple user-selectable pin-strapping option. Maximum gain nonlinearity is $\pm 0.01\%$.

The AM-551 dynamic characteristics include a settling time of $3\mu\text{s}$ for a 20V step to $\pm 0.01\%$ accuracy. Slew rate is $\pm 23\text{V}/\mu\text{s}$, and small signal bandwidth is 600kHz. Other specifications include a CMRR of 100dB, a $10^{12}\Omega$ input impedance and a minimum output voltage swing of $\pm 11\text{V}$. Maximum offset drift is $\pm 15\mu\text{V}/^\circ\text{C}$.

The AM-551 is a functionally complete device containing a high-impedance variable-gain voltage follower input stage followed by a differential output stage with user-selectable gains of 1 or 10. High-accuracy, ultra-low-drift, thin-film technology is used for all interconnected resistor networks.

The combination of accuracy, speed and rugged hybrid construction make the AM-551 an ideal choice for applications involving the amplification of low-level signals produced by thermocouples, strain gages and RTD's, high-performance data acquisition systems and instrumentation systems.

INPUT/OUTPUT CONNECTIONS

PIN	FUNCTION
1	INPUT OFFSET ADJUST
2	R_G (Gain Resistor)
3	+INPUT
4	R_G (Gain Resistor)
5	-INPUT
6	-15V SUPPLY
7	SIGNAL COMMON
8	OUTPUT OFFSET ADJ. WIPER
9	OUTPUT OFFSET ADJUST
10	OUTPUT OFFSET ADJUST
11	OUTPUT
12	OUTPUT GAIN SELECT
13	GUARD
14	+15V SUPPLY
15	INPUT OFFSET ADJUST
16	INPUT OFFSET ADJ. WIPER

Power requirements are $\pm 15\text{V}$, and all devices are cased in miniature, 16-pin ceramic DIP's. Models are available for commercial (0 to $+70^\circ\text{C}$) or military (-55 to $+125^\circ\text{C}$) operating temperature ranges.

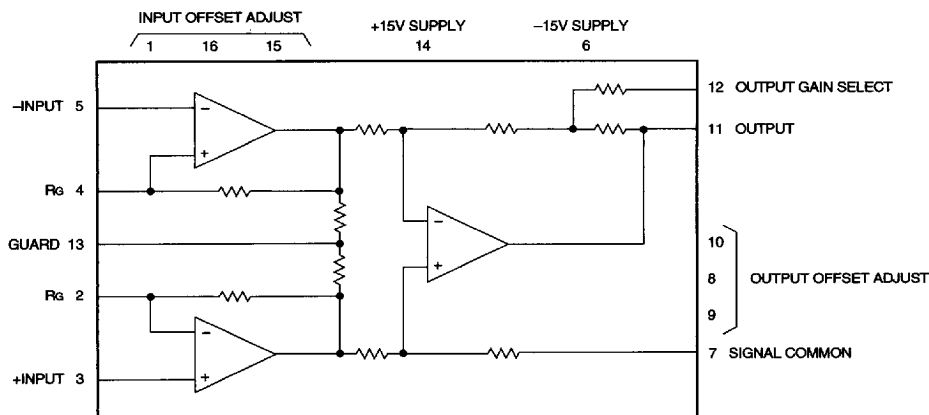


Figure 1. AM-551 Functional Block Diagram

2651561 0003665 90T

ABSOLUTE MAXIMUM RATINGS

PARAMETERS	MIN.	TYP.	MAX.	UNITS
+15V Supply (Pin 14)	—	+18	—	Volts
−15V Supply (Pin 6)	—	−18	—	Volts
Input Voltage Range	—	±18	—	Volts
Differential Input Voltage Range	—	±30	—	Volts
Lead Temperature (soldering, 10 seconds)	—	300	—	°C
Output Short Circuit	Continuous			

FUNCTIONAL SPECIFICATIONS

(Typical at +25°C and ±15V supplies, unless otherwise noted.)

INPUT	MIN.	TYP.	MAX.	UNITS
Common Mode Voltage Range	±11	—	—	Volts
Input Impedance (differential or common mode)	—	10 ¹²	—	Ω
Input Bias Current	—	—	±100	pA
Input Offset Current	—	—	±20	pA
Input Offset Voltage (unadj.) ①	—	—	±1	mV x gain
PERFORMANCE				
Gain Range ②	1	—	50	V/V
Gain Equation ③	$G = (1 + 20k/R_G) G_2$			
Gain Accuracy G = 1	—	—	±0.04	%
G = 10	—	—	±0.1	%
G = >10	—	—	±0.2	%
Gain Nonlinearity	—	—	±0.01	%
Gain Tempco ④	—	—	±50	ppm/°C
Offset Voltage Drift	—	—	±15	μV/°C
Input Bias Current Drift	Doubles every 10°C			
Input Voltage Noise (dc to 100Hz)	—	20	—	nV/√Hz
Power Supply Rejection Ratio	70	82	—	dB
Common Mode Reject. Ratio ⑤				
1kHz	—	70	—	dB
100Hz	—	90	—	dB
DC	—	100	—	dB
Slew Rate	±9	±23	—	V/μs
Small Signal Bandwidth (–3dB)				
G = 1	—	600	—	kHz
G = 10	—	600	—	kHz
G = 50	—	200	—	kHz
Settling Time (20V to ±0.01%)				
G = 1	—	3	—	μs
G = 10	—	4	—	μs
G = 50	—	11	—	μs
OUTPUT				
Output Voltage Range ⑥	±11	—	—	Volts
Output Current	±5	—	—	mA
Output Impedance ⑦	—	0.5	—	Ω
Output Offset Voltage (unadj.) ①	—	—	±1	mV x gain
POWER REQUIREMENTS				
Rated Power Supply Voltages	—	±15	—	Volts
Power Supply Range	±5	—	±18	Volts
Supply Current	—	—	±27	mA

Footnotes:

- ① Adjustable to zero.
- ② To 0.01% accuracy. Higher gains are achievable, but performance will degrade.
- ③ See Technical Note 3.
- ④ $\text{Tempco of } R_G = \pm 0\text{ppm}/^\circ\text{C}$. For $R_G = \infty$, gain tempco = $\pm 5\text{ppm}/^\circ\text{C}$.
- ⑤ $1\text{k}\Omega$ source imbalance.
- ⑥ $R_L = 2\text{k}\Omega$.
- ⑦ At 1kHz , for all gain ranges.

PHYSICAL/ENVIRONMENTAL

PARAMETERS	MIN.	TYP.	MAX.	UNITS
Operating Temp. Range, Case				
AM-551MC	0	—	+70	°C
AM-551MM	-55	—	+125	°C
Storage Temp. Range	-65	—	+150	°C
Package Type	16-pin ceramic DIP			

TECHNICAL NOTES

1. A 100k Ω trimpot may be used for both input and output offset adjusts. The trimpot is connected across the INPUT OFFSET ADJUST pins (pins 1, 15) and the wiper is connected to pin 16.

For output offset adjust, the trimpot is connected across the OUTPUT OFFSET ADJUST pins (pins 10, 9) with the wiper connected to pin 8.
2. For unity gain, R_G is left open and OUTPUT GAIN SELECT (pin 12) is tied to OUTPUT (pin 11). To avoid oscillation in the unity-gain configuration, the connection between OUTPUT GAIN SELECT and OUTPUT should be kept as short as possible.
3. Gain selection is accomplished in two stages. The input stage gain (G_1) is selected by an external gain resistor (R_G) connected across the R_G pins (pins 2, 4), and is expressed as follows:

$G_1 = 1 + \frac{R_G}{20k}$

$$G_1 = 1 + \frac{20k}{R_G}$$

The output stage gain (G_2) is selected by external pin-strapping. For $G_2 = 1$, connect OUTPUT GAIN SELECT (pin 12) to OUTPUT (pin 11). For $G_2 = 10$, connect OUTPUT GAIN SELECT (pin 12) to SIGNAL COMMON (pin 7).

The total gain of the amplifier is as follows:

$$G_t = G_1 \times G_2 = \left(1 + \frac{20k}{B_G}\right) G_2$$

4. Both power supplies should be bypassed to ground with $0.1\mu\text{F}$ ceramic capacitors.

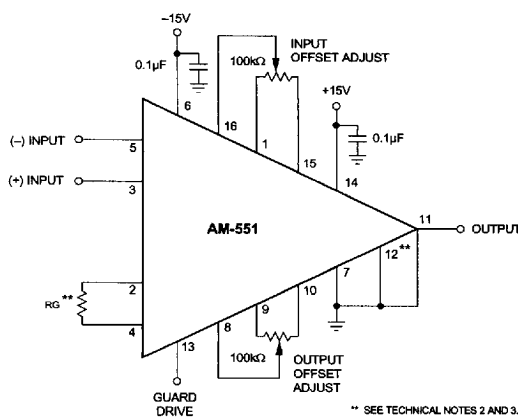
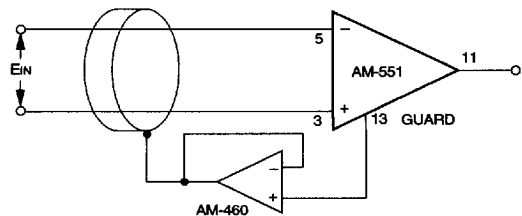
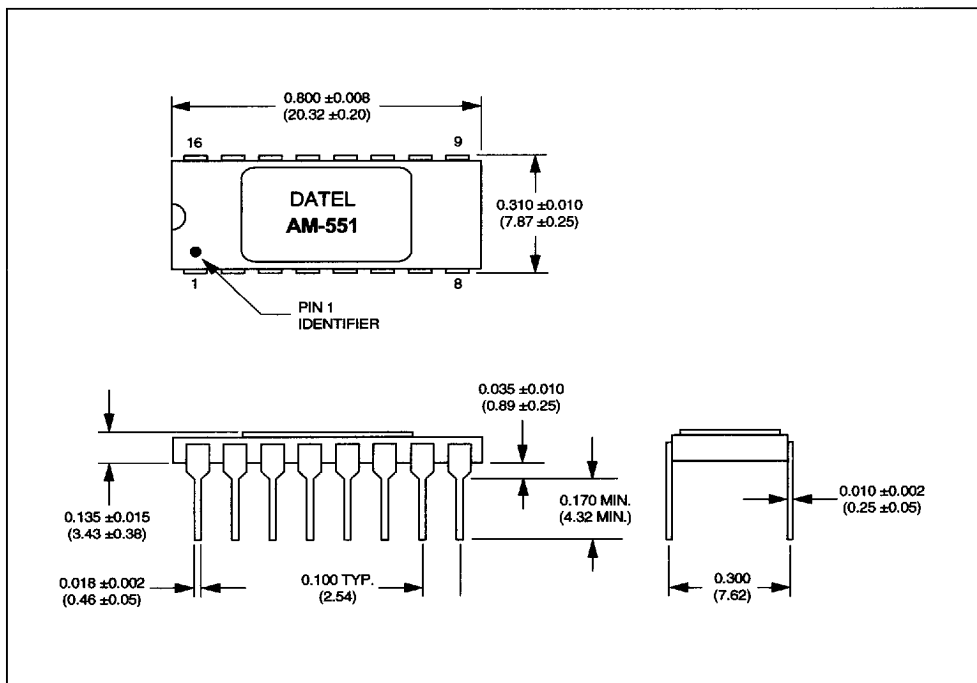


Figure 2. Typical Connections

GUARD DRIVE CONNECTION

A GUARD (pin 13) is provided to improve ac common mode rejection by compensating for unbalanced capacitance due to long input leads. Use of the guard function is recommended whenever input leads are longer than a few inches. In cases in which the input leads are very long or when system bandwidth is very high, the addition of a buffer amplifier is recommended. The diagram to the right shows a typical guard drive connection to the AM-551 using DATEL's AM-460.

MECHANICAL DIMENSIONS
INCHES (mm)

ORDERING INFORMATION

MODEL

AM-551MC

AM-551MM

OPERATING
TEMP. RANGE

0 to +70°C

-55 to +125°C

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