DESCRIPTION

The AO1170 offers high voltage (36V), cost-optimized operation amplifier. AO1170 also offers strong general-purpose DC and AC specifications, including rail-to-rail output, low offset, low offset drift and 1.2MHz bandwidth.

Convenient features such as wide differential input voltage range, high output current, and high slew rate of 0.67V/us make the AO1170 a robust operational amplifier for high-voltage, cost-effective applications. as well as excellent speed/power consumption ratio, providing an excellent bandwidth (1.2MHz) and slew rate of 0.67V/us. The op-amps are unity gain stable and feature an ultra- low input bias current.

The AO1170 is stable at capacitance up to 100pF (Typ) and operation under single power supplies of 3V to 36V or dual power supplies of ±1.5V to ±18V.

The AO1170 is available in SOT-25 package.

ORDERING INFORMATION

Package Type	Part Number	
SOT-25 SPQ: 3,000pcs/Reel	E5	AO1170E5R-Z
		AO1170E5VR-Z
Note	Z: Package Type see pin description V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

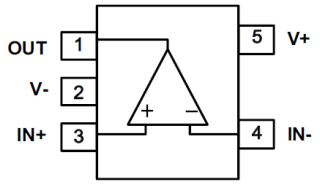
FEATURES

- Low Offset Voltage: ±0.8mV (Typical)
- Low Offset Voltage Drift: ±3uV/°C
- Low Noise: 45nV/√Hz at 1kHz
- High Common-Mode Rejection Ratio: 110dB
- Low Bias Current: ±10pA
- Rail-to-Rail Output
- Wide Bandwidth:1.2MHz GBW
- High Slew Rate: 0.67V/us
- Low Quiescent Current:150uA per Amplifier
- Supply Range: +3V to +36V
- Available in SOT-25 package

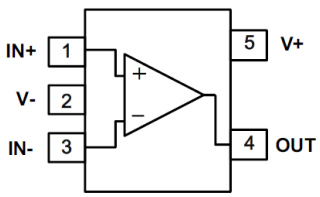
APPLICATION

- Merchant Network and Server PSU
- Industrial AC-DC & Merchant DC/DC
- Motor Drives: AC and Servo Drive Power Supplies
- Building Automation
- Sensors
- Photodiode Amplification
- Active Filters
- Test Equipment

TYPICAL APPLICATION

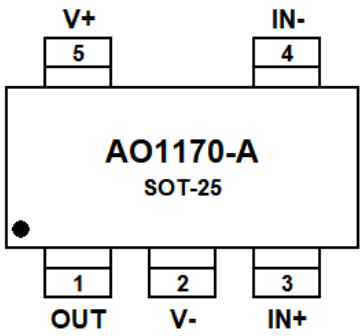


SOT-25-A

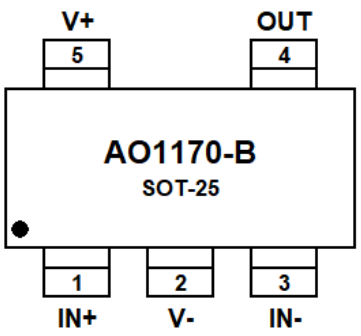


SOT-25-B

PIN DESCRIPTION



Top View



Top View

Pin # SOT-25 A	Pin # SOT-25 B	Symbol	I/O	Function
1	4	OUT	O	Output
2	2	V-	-	Negative (lowest) power supply or ground (for single supply operation)
3	1	IN+	I	Positive (noninverting) input
4	3	IN-	I	Negative (inverting) input
5	5	V+	-	Positive (highest) power supply

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range, unless otherwise noted

Supply Voltage, Vs=(V+) - (V-)		-0.7V ~ 36V
Signal Input Voltage Pin NOTE1		(V-)-0.2V ~ (V+)0.2V
Signal Output Voltage Pin NOTE2		(V-)-0.2V ~ (V+)0.2V
Signal Input Current Pin NOTE1		-10mA ~ 10mA
Signal Output Current Pin NOTE2		-100mA ~ 100mA
Output Short-Circuit Current NOTE3		Continuous
T_A, Operating Range Temperature		-40℃ ~ 125℃
T_J, Junction Temperature		150℃
T_{STG}, Storage Temperature		-55℃ ~ 150℃
ESD Ratings NOTE4		
$V_{(ESD)}$, Electrostatic discharge	Human-body model (HBM)	±5000V
	Machine Model (MM)	±200V

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

NOTE1: Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.5V beyond the supply rails should be current-limited to 10mA or less.

NOTE2: Output terminals are diode-clamped to the power-supply rails. Output signals that can swing more than 0.5V beyond the supply rails should be current-limited to ±100mA or less.

NOTE3: Short-circuit to ground, one amplifier per package.

NOTE4: JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

RECOMMENDED OPERATING CONDITIONS

over operating free-air temperature range, unless otherwise noted

Parameter		Min.	Typ.	Max.	Unit
Supply voltage Vs= (V+) - (V-)	Single-Supply	3	-	36	V
	Dual-Supply	±1.5	-	±18	

ELECTRICAL CHARACTERISTICS

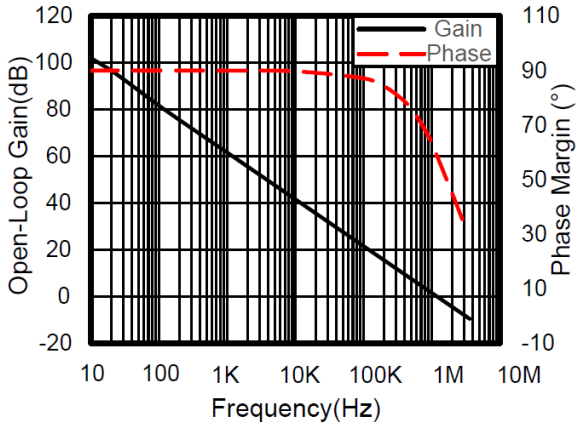
at T_A = +25°C, V_S=3V to 36V, R_L = 10kΩ connected to V_S/2, and V_{OUT} = V_S/2, unless otherwise noted.

Parameter	Symbol	Conditions	T_J	Min	Typ	Max	Units
POWER SUPPLY							
Operating Voltage Range	Vs		+25°C	3	-	36	V
Quiescent Current/Amplifier	I_Q	V_S=±2.5V, Io=0mA	+25°C	-	150	250	uA
		V_S=±18V, Io=0mA		-	200	350	
Power-Supply Rejection Ratio	PSRR	V_S=5V to 36V	+25°C	98	120	-	dB
INPUT							
Input Offset Voltage	Vos	V_{CM}=V_S/2	+25°C	-4	±0.8	4	mV
			-40°C to 125°C	-	±1.1		
Input Offset Voltage Average Drift	Vos Tc		-40°C to 125°C	-	3	-	uV/°C
Input Bias Current	I_B	V_{CM}=0V	+25°C	-	10	60	pA
			-40°C to 125°C	-	600	-	
Input Offset Current	I_{OS}	V_{CM}=0V	+25°C	-	10	60	pA
			-40°C to 125°C	-	600	-	
Common-Mode Voltage Range	V_{CM}	V_S=±18V	+25°C	(V-)-0.1	-	(V+)-2	V
Common-Mode Rejection Ratio	CMRR	V_S=±2.5V, V_{CM}=(V-)-0.1V to (V+)-2V	+25°C	70	110	-	dB
		V_S=±18V, V_{CM}=(V-)-0.1V to (V+)-2V	+25°C	70	-	-	
OUTPUT							
Open-Loop Voltage Gain	A_{OL}	R_L=10KΩ, Vo=(V-)-0.6V to (V+)-0.6V	+25°C	93	115	-	dB
Output Swing	V_{OH}	V_S=±18V, R_L=10KΩ	+25°C	17.85	-	-	V
	V_{OL}			-	-	-17.85	V
Short-Circuit Current	I_{SC}	V_S=36V, Vo=0V	+25°C	-	70	-	mA
Capacitive Load Drive	C_{LOAD}		+25°C	-	100	-	pF
FREQUENCY RESPONSE							
Slew Rate	SR	G=+1, C_L=100pF	+25°C	-	0.67	-	V/us
Gain-Bandwidth Product	GBW		+25°C	-	1.2	-	MHz
Setting Time,0.01%	ts	V_S=±2.5V, G=+1, C_L=100pF, Step=2V	+25°C	-	5	-	us
Overload Recovery Time	t_{OR}	V_{IN}·Gain≥V_S, G=11	+25°C	-	5	-	us
Turn On Time	t_{ON}		+25°C	-	10	-	us
NOISE							
Input Voltage Noise	En	f=0.1Hz to 10Hz, Vs=±2.5V	+25°C	-	16	-	uVpp
Input Voltage Noise Density	en	f=1KHz	+25°C	-	45	-	nV/√Hz

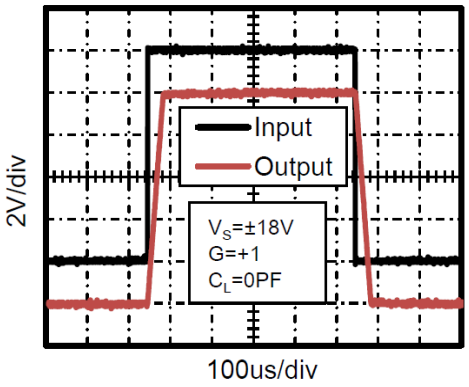
TYPICAL PERFORMANCE CHARACTERISTICS

at T_A = +25°C, V_S=±18V, R_L = 10kΩ connected to V_S/2, V_{OUT} = V_S/2, unless otherwise noted.

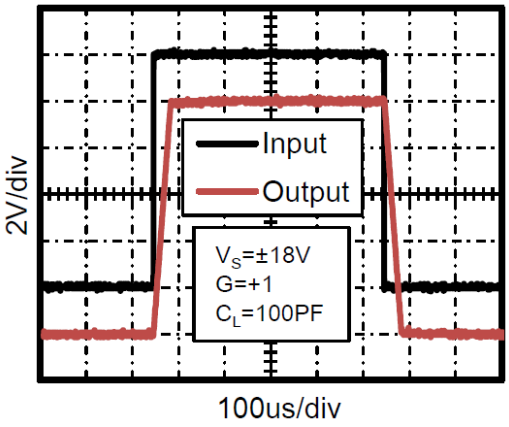
1. Open-Loop Gain and Phase vs. Frequency



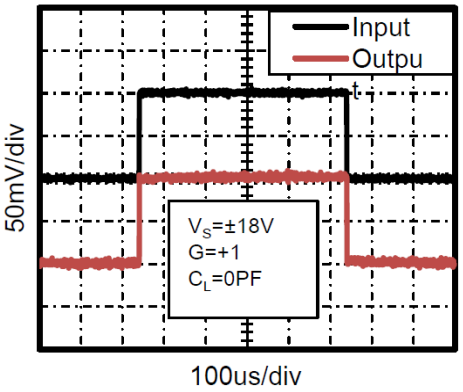
2. Large Signal Step Response



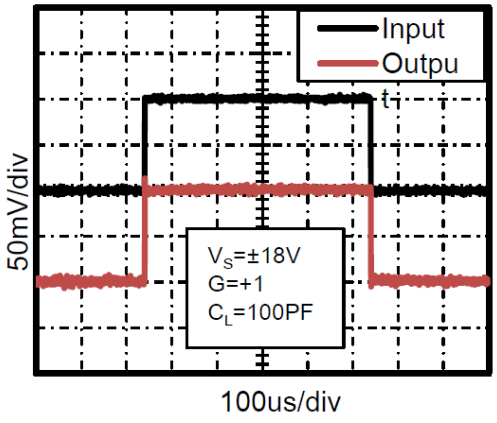
3. Large Signal Step Response



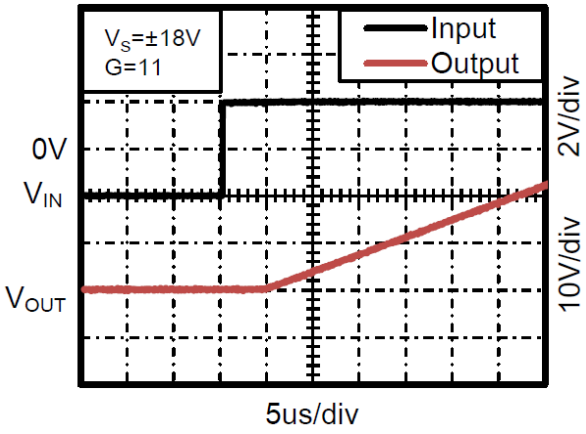
4. Small Signal Step Response



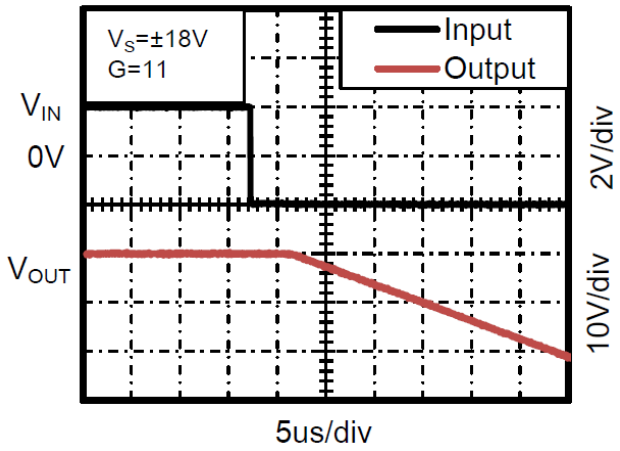
5. Small Signal Step Response



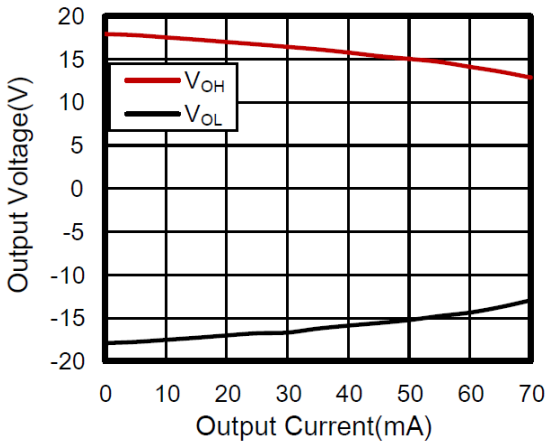
6. Positive Overvoltage Recovery



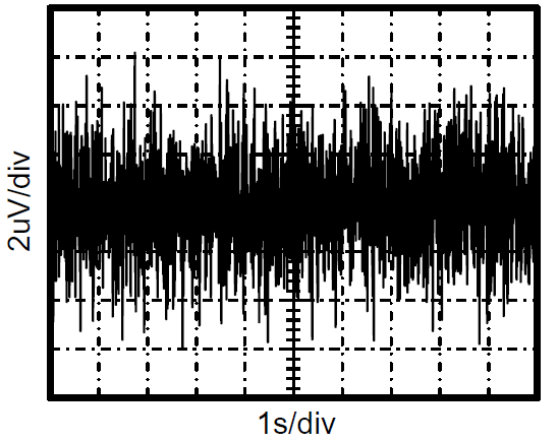
7. Negative Overvoltage Recovery



8. Output Voltage Swing vs Output Current

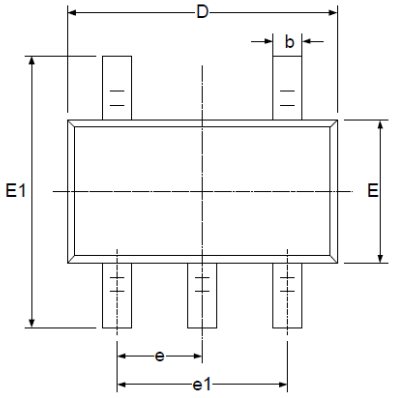


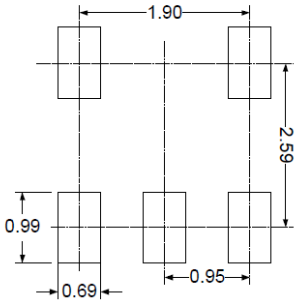
9. 0.1Hz to 10Hz Noise at V_S=5V



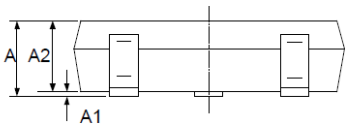
PACKAGE INFORMATION

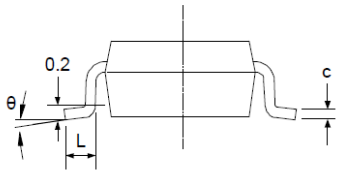
Dimension in SOT-25 (Unit: mm)





RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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