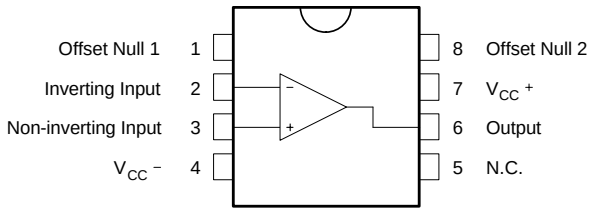
Very low offset single bipolar operational amplifier

Features

- Extremely low offset: 75µV/ max.
- Low input bias current: 1.8nA
- LOW V_{io} drift: 0.25µV/°C
- Ultra stable with time: 2µV/month max.
- Wide supply voltage range: ±3V to ± 22V
- Temperature range: 0°C to -105°C

Pin connections
(top view)



Description

The OP07B is a very high precision op-amp with an offset voltage maximum of 75µV.

Offering also low input current (1.8nA) and high gain (400V/mV), the OP07B is particularly suitable for instrumentation applications.

1 Schematic diagram

Figure 1. Schematic diagram

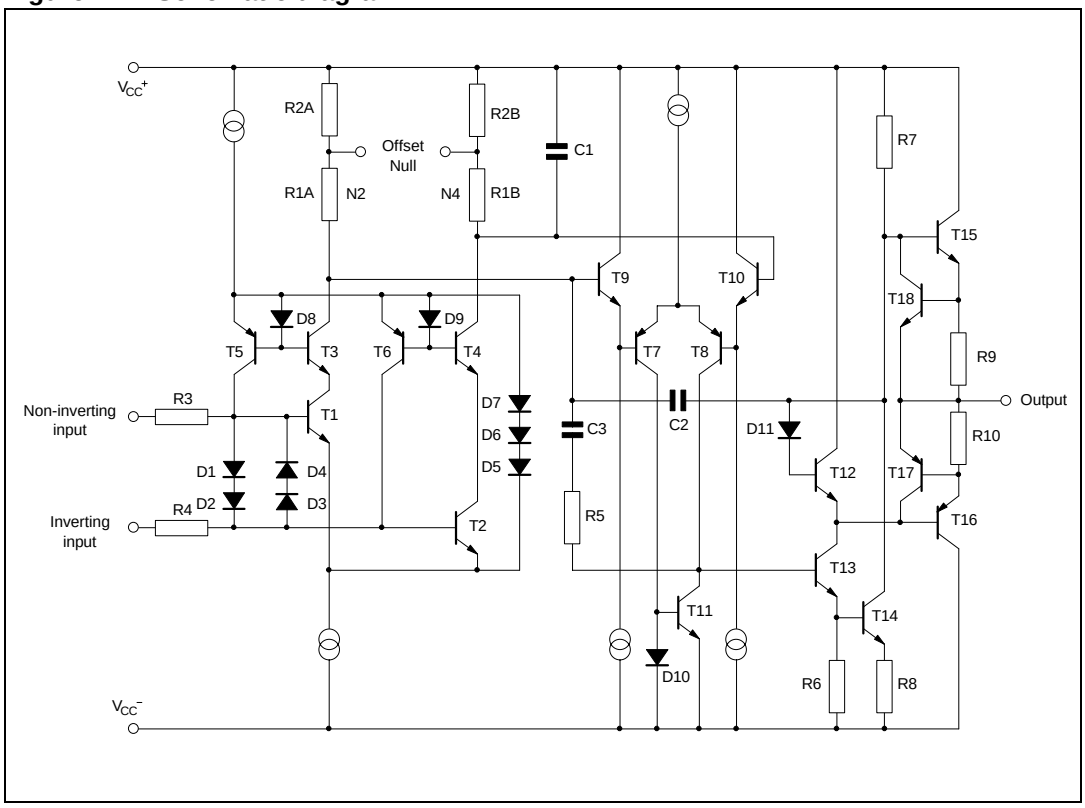
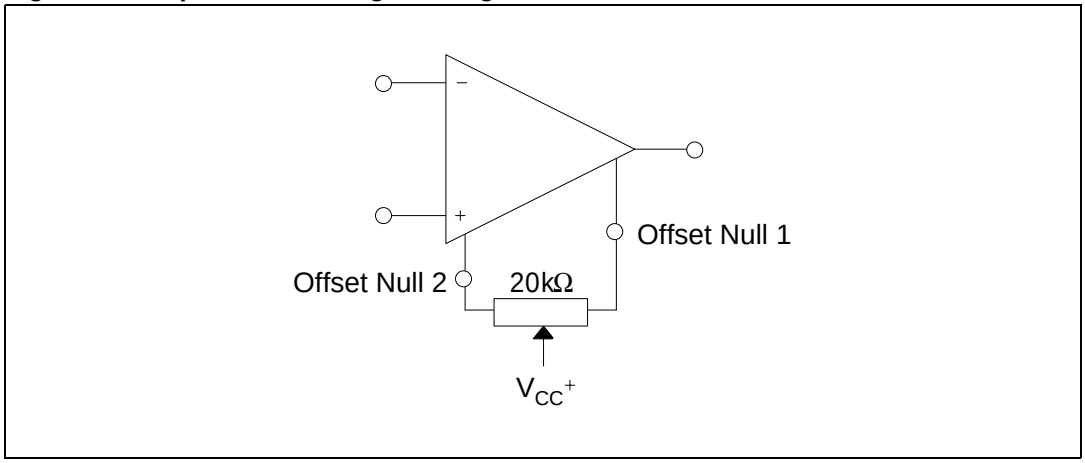


Figure 2. Input offset voltage nulling circuit



2 Absolute maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	± 22	V
V_{id}	Differential input voltage	± 30	V
V_i	Input voltage	± 22	V
T_{oper}	Operating temperature	-40 to 105	°C
T_{stg}	Storage temperature	-65 to 150	°C
R_{thja}	Thermal resistance junction to ambient(1) (2) DIP8	85	°C/W
R_{thjc}	Thermal resistance junction to case(1) (2) DIP8	41	°C/W
ESD	HBM: human body model(3)	1.5	kV
	MM: machine model(4)	200	V
	CDM: charged device model(5)	1.5	kV

1. Short-circuits can cause excessive heating and destructive dissipation.
2. R_{th} are typical values.
3. Human body model: 100pF discharged through a 1.5kΩ resistor between two pins of the device, done for all couples of pin combinations with other pins floating.
4. Machine model: a 200pF cap is charged to the specified voltage, then discharged directly between two pins of the device with no external series resistor (internal resistor < 5Ω). Done for all couples of pin combinations with other pins floating.
5. Charged device model: all pins plus package are charged together to the specified voltage and then discharged directly to the ground.

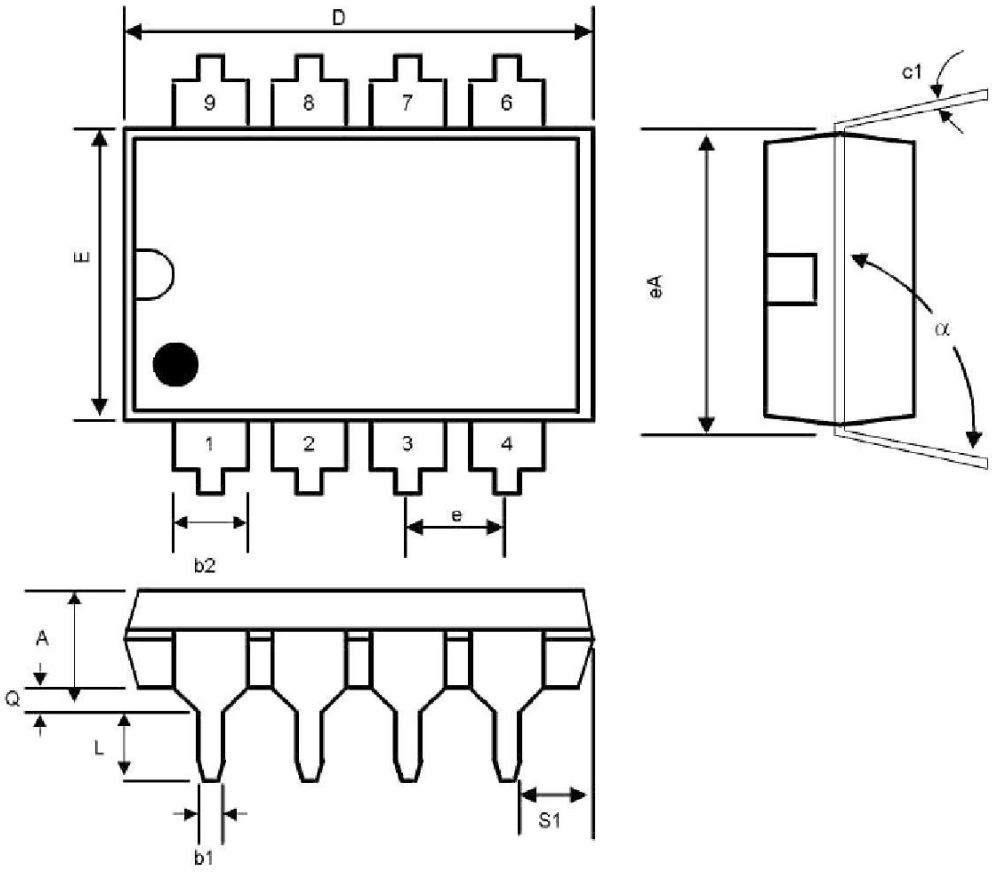
3 Electrical characteristics

Table 2. V_{CC}^{+} = 15 V, V_{CC}^{-} = Ground, T_{amb} = 25° C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage 0°C ≤ T_{amb} ≤ +105°C			25 75	µV
	Long term input offset - voltage stability (1)		0.4	2	µV/Mo
DV_{io}	Input offset voltage drift		0.5	1.8	µV/°C
I_{io}	Input offset current (V_{ic} = 0V) 0°C ≤ T_{amb} ≤ +105°C		0.8	3 5	nA
DI_{io}	Input offset current drift		15	50	pA/°C
DI_{ib}	Input bias current drift		15	50	pA/°C
R_o	Open loop output resistance		60		Ω
R_{id}	Differential input resistance		33		MW
R_{ic}	Common mode input resistance		120		GW
V_{icm}	Input common mode voltage range 0°C ≤ T_{amb} ≤ +105°C	±13 ±13	±13.5		V
CMR	Common-mode rejection ratio (V_{ic} = $V_{icm\ -min}$) 0°C ≤ T_{amb} ≤ +105°C	100 97	120		dB
SVR	Supply voltage rejection ratio (V_{CC} = ±3 to ±18V) 0°C ≤ T_{amb} ≤ +105°C	90 86	104		dB
A_{vd}	Large signal voltage gain V_{CC} = ±15, R_L = 2kΩ, V_O = ±10V 0°C ≤ T_{amb} ≤ +105°C V_{CC} = ±3, R_L = 500Ω, V_O = ±0.5V	 120 100 100	 400 400		V/mV
V_{opp}	Output voltage swing R_L = 10kΩ R_L = 2kΩ R_L = 1kΩ 0°C ≤ T_{amb} ≤ +105°C R_L = 2kΩ	 ±12 ±11.5 ±11	 ±13 ±12.8 ±12		V
SR	Slew rate (R_L = 2kΩ, C_L = 100pF)		0.17		V/µs
GBP	Gain bandwidth product (R_L = 2kΩ, C_L = 100pF, f = 100kHz)		0.5		MHz
I_{CC}	Supply current - no load 0°C ≤ T_{amb} ≤ +105°C V_{CC} = ±3V		2.7 0.67	5 6 1.3	mA
e_n	Equivalent input noise voltage f = 10Hz f = 100Hz f = 1kHz		 11 10.5 10	 20 13.5 11.5	$\frac{nV}{\sqrt{Hz}}$
i_n	Equivalent input noise current f = 10Hz f = 100Hz f = 1kHz		 0.3 0.2 0.1	 0.9 0.3 0.2	$\frac{pA}{\sqrt{Hz}}$

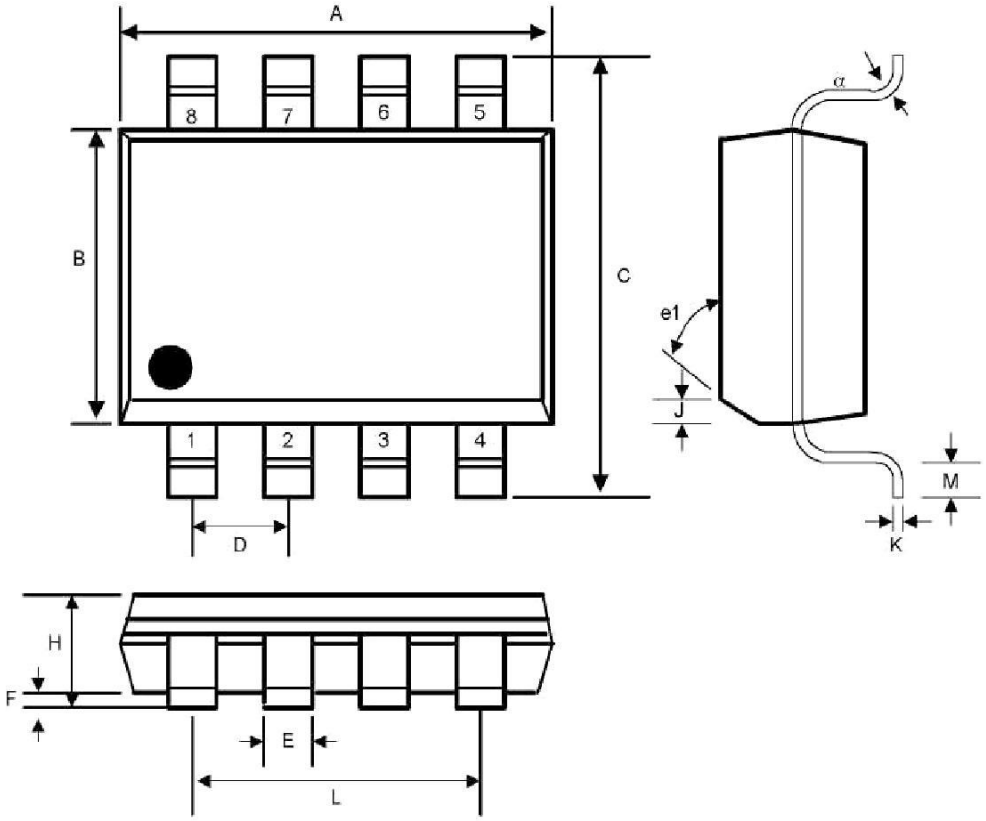
1. Long term input offset voltage stability refers to the average trend line of Vio vs time over extended periods after the first 30 days of operation.

Package Outlines: DIP-8



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	-	0.200	-	5.08	-
b1	0.014	0.023	0.36	0.58	-
b2	0.045	0.065	1.14	1.65	-
c1	0.008	0.015	0.20	0.38	-
D	0.355	0.400	9.02	10.16	-
E	0.220	0.310	5.59	7.87	-
e	0.100 BSC		2.54 BSC		-
eA	0.300 BSC		7.62 BSC		
L	0.125	0.200	3.18	5.08	-
Q	0.015	0.060	0.38	1.52	-
s1	0.005	-	0.13	-	-
α	90^0	105^0	90^0	105^0	-

Small Outline SOP-8



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.188	0.197	4.80	5.00	-
B	0.149	0.158	3.80	4.00	-
C	0.228	0.244	5.80	6.20	-
D	0.050 BSC		1.27 BSC		-
E	0.013	0.020	0.33	0.51	-
F	0.004	0.010	0.10	0.25	-
H	0.053	0.069	1.35	1.75	-
J	0.011	0.019	0.28	0.48	
K	0.007	0.010	0.19	0.25	-
M	0.016	0.050	0.40	1.27	
L	0.150 REF		3.81 REF		-
e1	45^0		45^0		-
α	0^0	8^0	0^0	8^0	-

*All specs and applications shown above subject to change without prior notic.

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