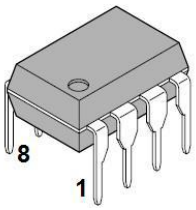
AS3080E – Operational Transconductance Amplifier (OTA) with linearizing diodes

Features

- maximum offset . . . . . < 800 µV
- slew rate (unity gain, compensated). 50V/µs
- adjustable power consumption. . . .10µW to 30µW
- flexible supply voltage range. . . . . ±2V to ±15V
- fully adjustable gain. . . . . 0 to $g_M R_L$ Limit
- tight g_M spread. 1,6:1
- extended g_M linearity . . . . . .4 Decades
- linearizing diodes

AS3080E



PDIP-8 300mil, 2.54 mm

Applications

- Sample and Hold
- Multiplexer
- Voltage Follower
- Multiplier
- Comparator

AS3080ED

SOIC-8 150mil, 1.27 mm

General Description

The AS3080E is a gain block which is the operational-transconductance-amplifier (OTA).

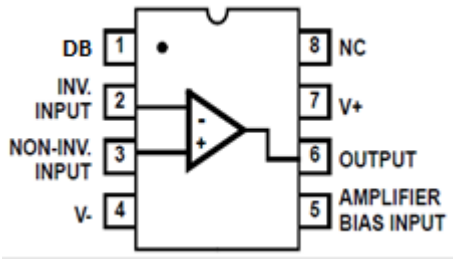
The AS3080E have differential input and a single-ended, push-pull, class A output. Amplifier bias input may be used either for gating or for linear gain control. High output impedance and transconductance (g_M) is directly proportional to the amplifier bias current (I_{ABC}). Linearizing diodes are provided at the inputs to reduce distortion and allow higher input levels. The result is a 10-dB signal-to-noise improvement referenced to 0,5 percent THD.

The AS3080E is notable for it's high slew rate (50V/µs), which makes it especially useful for multiplexer and fast unity-gain voltage followers. It is especially applicable for multiplexer applications because power is consumed only when the devices are in the "ON" channel state.

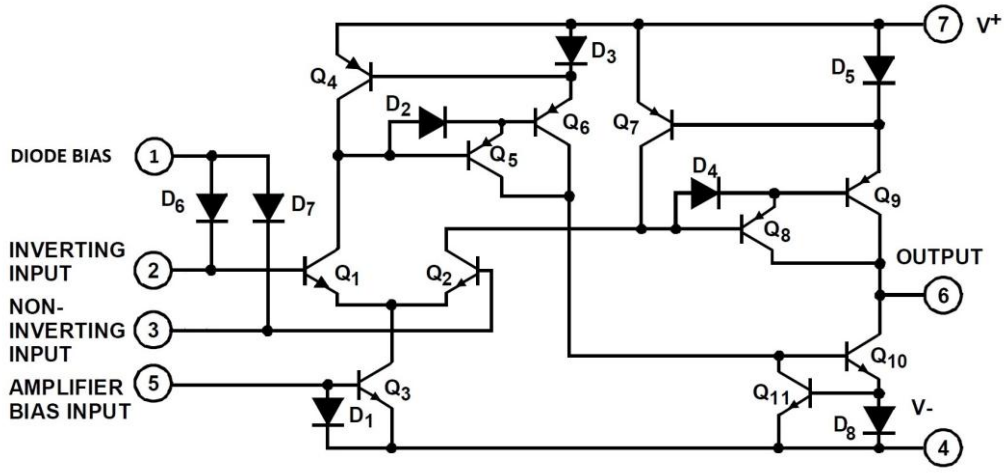
Pin Information

Pin No	Pin Name	Description
1	DB	Diode Bias
2	-IN	Inverting input
3	+IN	Noninverting input
4	$-V_{EE}$	Negative supply
5	I_{ABC}	Amplifier bias input
6	OUT	Output
7	$+V_{CC}$	Positive supply
8	NC	Not connect

Pinouts (PDIP, SOIC)
Top view



Functional diagram of AS3080E



Absolute Maximum Ratings

Supply Voltage (Between V+ and V-)……..+36V
Differential Input Voltage……5V
Input Voltage Range ……V+ to V-
Input Signal Current ……1mA
Amplifier Bias Current (I_{ABC})……10mA
Output Short Circuit Duration (Note 1)……..Indefinite
Linearizing Diode Bias Current, I_{DB}……..5mA
Peak Input Current with Linearizing Diode……$\pm I_{DB}$

Operating Conditions

Temperature Range
AS3080E ..... 0^oC to 70^oC
Supply Voltage Range (Typ)……±2V to ±15V

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:
1. Short circuit may be applied to ground or to either supply.

Electrical Specifications

T_A=25°C, V_{SUPPLY}=±15V, unless otherwise specified

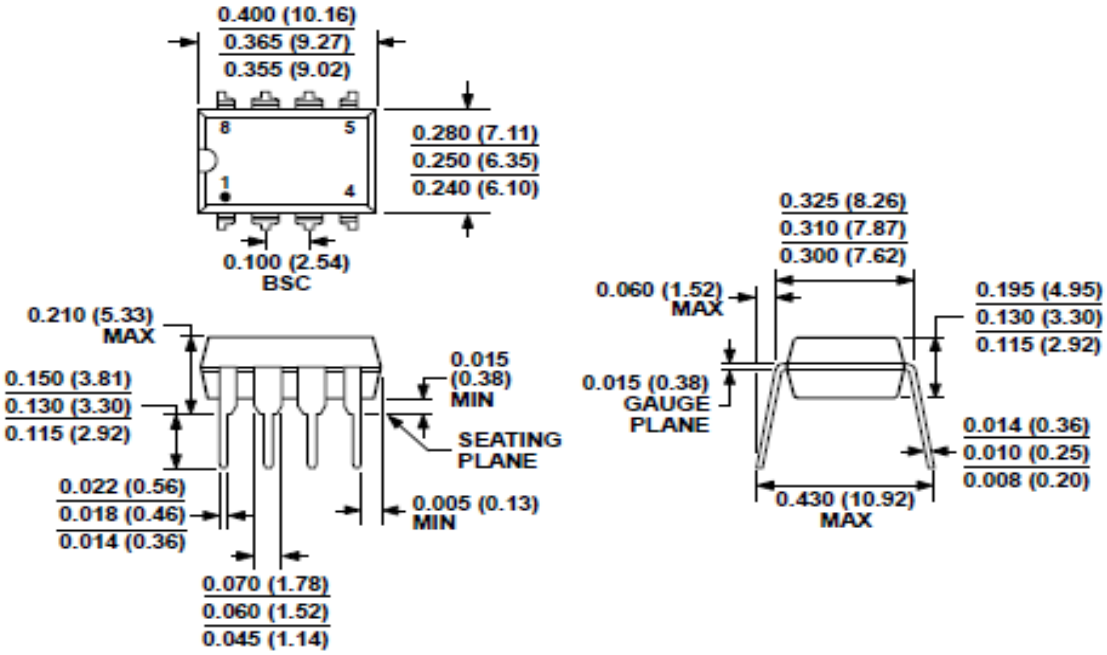
PARAMETER		SYMBOL	TEST CONDITIONS	AS3080E			UNITS
				MIN	TYP	MAX	
Input Offset Voltage		V_{IO}	I_{ABC} = 5µA	-	300	800	µV
			I_{ABC} = 500µA	-	400	800	µV
Input Offset Voltage Change		$\|\Delta V_{IO}\|$	I_{ABC} = 500µA to 5µA	-	200	800	µV
V_{OS} including diodes (VosDB)		$\|\Delta V_{IODB}\|$	I_{db} = 500 µA		800	1500	µV
Input Offset Voltage Drift		$\|\Delta V_{IO}/\Delta T\|$	I_{ABC} = 100µA, T_A = Full Temperature Range	-	3	-	µV/°C
Input Offset Voltage Sensitivity	Positive	$\Delta V_{IO}/\Delta V+$	I_{ABC} = 500µA	-	-	150	µV/V
	Negative	$\Delta V_{IO}/\Delta V$ -		-	-	150	µV/V
Input Offset Current		I_{IO}	I_{ABC} = 500µA	-	0,12	0,6	µA
Input Bias Current		I_{IB}	I_{ABC} = 500µA	-	2	5	µA
			I_{ABC} = 500µA, T_A = Full Temperature Range	-	-	15	µA
Differential Input Current		I_{ID}	I_{ABC} = 0, V_{DIFF} = 4V	-	0,008	5	nA
Amplifier Bias Voltage		V_{ABC}	I_{ABC} = 500µA	-	0,71	-	V
Input Resistance		R_I	I_{ABC} = 500µA	10	26	-	kΩ
Output Resistance		R_O	I_{ABC} = 500µA	-	15	-	MΩ
Input Capacitance		C_I	I_{ABC} = 500µA, f = 1MHz	-	3.6	-	pF
Output Capacitance		C_O	I_{ABC} = 500µA, f = 1MHz	-	7,5	-	pF

PARAMETER		SYMBOL	TEST CONDITIONS	AS3080E			UNITS
				MIN	TYP	MAX	
Input-to-Output Capacitance		C_{IO}	I_{ABC} = 500µA, f = 1MHz	-	0,024	-	pF
Common Mode Input-Voltage Range		V_{ICR}	I_{ABC} = 500µA	-	12 to -12	13,6 to -14,6	V
Forward Transconductance (Large Signal)		G_M	I_{ABC} = 500µA,	7700	9600	12000	µS
			Full Temp. Range	4000	-	-	µS
Peak Output Current	Source	I_{OM+}	I_{ABC} = 5µA, R_L = 0Ω	3	5	7	µA
	Sink	I_{OM-}	I_{ABC} = 500µA, R_L = 0Ω	350	500	650	µA
Peak Output Current Sink and Source		I_{OM}	I_{ABC} = 500µA, R_L = 0Ω Full Temp. Range	300	-	-	µA
Peak Output Voltage	Positive	V_{OM+}	I_{ABC} = 5µA, R_L = ∞	12	13,8	-	V
	Negativ	V_{OM-}		-12	-14,5	-	V
	Positive	V_{OM+}	I_{ABC} = 500µA, R_L = ∞	12	13,5	-	V
	Negativ	V_{OM-}		-12	-14,4	-	V
Amplifier Supply Current		I+	I_{ABC} = 500µA	0,8	1	1,2	mA
Device Dissipation		P_D	I_{ABC} = 500µA	24	30	36	mW
Magnitude of Leakage Current		I_{OL}	I_{ABC} = 0, V_{TP} = 0V	-	0,08	5	nA
			I_{ABC} = 0, V_{TP} = 36V	-	0,3	5	nA
Common Mode Rejection Ratio		CMRR	I_{ABC} = 500µA	80	110	-	dB
Propagation Delay		t_{PHL}, t_{PLH}	I_{ABC} = 500µA	-	45	-	ns
Open-Loop Bandwidth		BW_{OL}	I_{ABC} = 500µA	-	2	-	MHz
Slew Rate,		SR_U	Uncompensated	-	75	-	V/µs
		SR_C	Compensated	-	50	-	V/µs

Device type	Package
AS3080E	PDIP-8 (300mil)
AS3080E D	SOIC-8 (150mil)

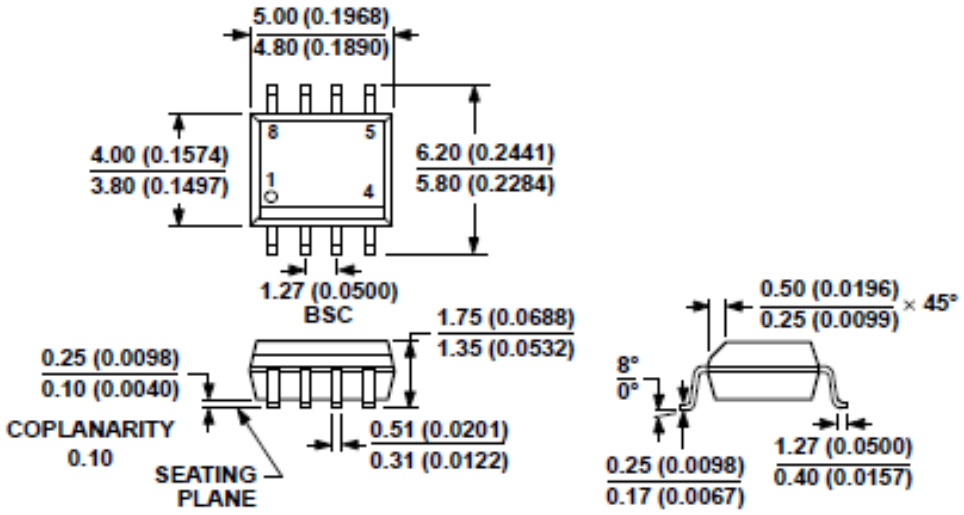
OUTLINE DIMENSIONS
Dimensions show in inches and (millimeters)

AS3080E



8-Lead Plastic Dual In-Line Package (PDIP)

AS3080ED



8-Lead Standard Small Outline Package (SOIC_N)

Revision history

Date	Revision	Changes
17-Aug-2020	1	Initial version