AS3280 – Dual Operational Transconductance Amplifier (OTA)

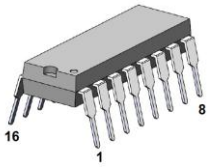
Features

- Low Initial Input Offset Voltage: 500 µV (Max) (AS3280A)
- Low Offset Voltage Change vs I_{ABC}: <500 µV (Typ)
- Low Offset Voltage Drift: 5µV/°C (Max) (AS3280A)
- Excellent Matching of the Two Amplifiers for All Characteristics
- Internal Current-Driven Linearizing Diodes Reduce the External Input Current to an Offset Component
  Flexible Supply Voltage Range ±2V to ±15V

Applications

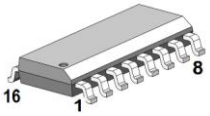
- Voltage Controlled Amplifiers Oscillators
- Multipliers
- Demodulators
- Sample and Hold
- Instrumentation Amplifiers
- Function Generators
- Triangle Wave-to-Sine Wave Converters
- Comparators
- Audio Preamplifier

AS3280, AS3280A



PDIP-16 300mil, 2.54 mm

AS3280D, AS3280AD



SOIC-16 150mil, 1.27 mm

General Description

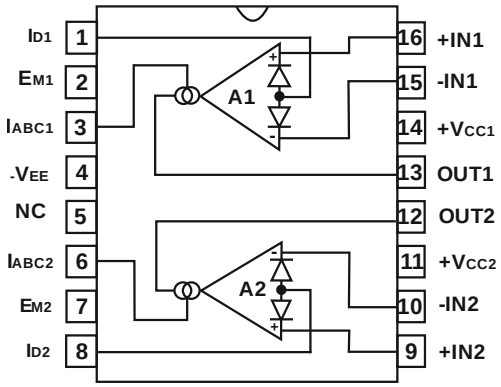
The AS3280 and AS3280A types consist of two variable operational amplifiers that are designed to substantially reduce the initial input offset voltage and the offset voltage variation with respect to changes in programming current. This design results in reduced "AGC thump," an objectionable characteristic of many AGC systems. Careful design of critical places of the circuit reduces the amplifier dependence upon thermal and processing variables.

The AS3280 has all the generic characteristics of an operational voltage amplifier except that the forward transfer characteristics is best described by transconductance rather than voltage gain, and the output is current, not voltage. The magnitude of the output current is equal to the product of transconductance and the input voltage. This type of operational transconductance amplifier has since gained wide acceptance as a gateable, gain controlled building block for instrumentation and audio applications, such as linearization of transducer outputs, standardization of widely changing signals for data processing, multiplexing, instrumentation amplifiers operating from the nanopower range to high current and high speed comparators.

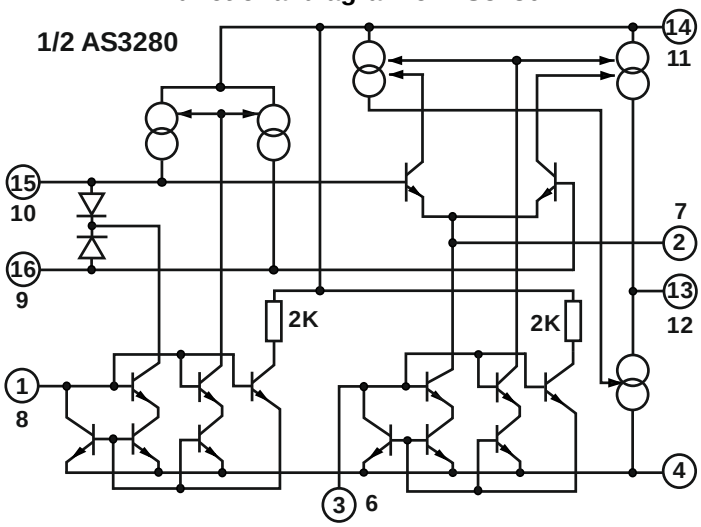
Pin Information

PDIP-16 SOIC-16 Pin No	Pin Name	Description
1	I_{D1}	Input current with linearizing diode 1
2	E_{M1}	Emitter 1
3	I_{ABC1}	Amplifier bias current 1
4	$-V_{EE}$	Negative supply
5	NC	Not connect
6	I_{ABC2}	Amplifier bias current 2
7	E_{M2}	Emitter 2
8	I_{D2}	Input current with linearizing diode 2
9	+IN2	Noninverting input1
10	-IN2	Inverting input 2
11	$+V_{CC2}$	Positive supply 2
12	OUT2	Output 2
13	OUT1	Output 1
14	$+V_{CC1}$	Positive supply 1
15	-IN1	Inverting input 1
16	+IN1	Noninverting input1

Pinout Top view



Functional diagram of AS3280



Absolute Maximum Ratings

Supply Voltage (Between V+ and V-)……..+36V
Differential Input Voltage……5V
Input Voltage Range……V+ to V-
Input Current at I_D = 0……100µA
Amplifier Bias Current (I_{ABC})……10mA
Output Short Circuit Duration (Note 1)……..Indefinite
Linearizing Diode Bias Current, I_D……5mA
Peak Input Current with Linearizing Diode……..±I_D

Operating Conditions

Temperature Range
AS3280, AS3280A ..... 0°C to 70°C
Supply Voltage Range (Typ)……±2V to ±15V

Thermal Information

Thermal Resistance (Typical, Note 2)	θ_{JA} (°C/W)	θ_{JC} (°C/W)
PDIP-16 Package……..	90	N/A
SOIC-16 Package……..	100	N/A

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.
2. θ_{JA} is measured with the component mounted on a low effective thermal conductivity test board in free air.

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

PARAMETER	SYMBOL	TEST CONDITIONS		AS3280			AS3280A			UNITS
				MIN	TYP	MAX	MIN	TYP	MAX	
Input Offset Voltage	V_{IO}	I_{ABC} = 1mA		-	-	1,8	-	-	0,5	mV
		I_{ABC} = 100µA		-	0,7	1,8	-	0,25	0,5	mV
		I_{ABC} = 10µA		-	-	1,8	-	-	0,5	mV
		I_{ABC} = 1mA to 10µA, T_A = Full Temp. Range		-	0,8	4	-	0,8	1,5	mV
Input Offset Voltage Drift	$\|\Delta V_{IO}\|$	I_{ABC} = 1 µA to 1mA		-	0,5	1	-	0,5	1	mV
		I_{ABC} = 100µA, T_A = Full Temperature Range		-	5	-	-	3	5	µV/°C
Amplifier Bias Voltage	V_{ABC}	I_{ABC} = 100µA		-	1,2	-	-	1,2	-	V
Peak Output Voltage	V_{OM+}	I_{ABC} = 500µA		12,5	12,6	-	12,5	12,6	-	V
	V_{OM-}			-	-13,5	-12,5	-	-13,5	-12,5	V
	V_{OM+}	I_{ABC} = 5µA		12,5	12,8	-	12,5	12,8	-	V
	V_{OM-}			-	-13,5	-12,5	-	-13,5	-12,5	V
Common Mode Input Voltage Range	V_{ICR}	I_{ABC} = 100µA		-13	-	13	-13	-	13	V
Noise Voltage	e_N	I_{ABC} = 500µA	-	20	-		-	20	-	nV/√Hz
			-	8	-		-	8	-	nV/√Hz
			-	7	-		-	7	-	nV/√Hz
Input Offset Current	I_{IO}	I_{ABC} = 500µA		-	0,3	0,5	-	0,3	0,5	µA
Input Bias Current	I_{IB}	I_{ABC} = 500µA		-	0,1	5	-	0,1	5	µA
		I_{ABC} = 500µA, T_A = Full Temperature Range		-	3	8	-	3	8	µA

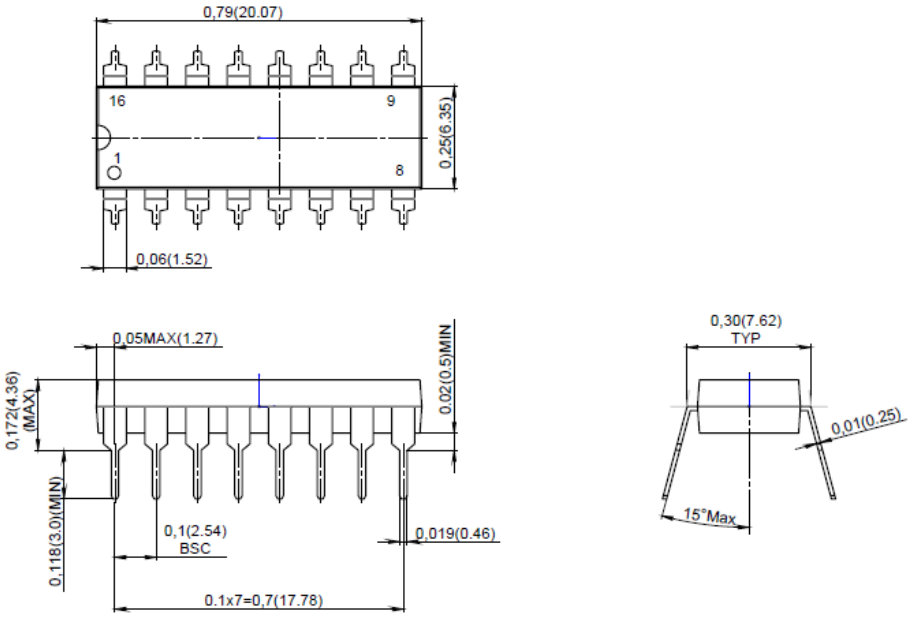
Electrical Specifications T_A=25°C, V_{SUPPLY}=±15V, unless otherwise specified (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS		AS3280			AS3280A			UNITS
				MIN	TYP	MAX	MIN	TYP	MAX	
Peak Output Current	I_{OM}+	I_{ABC} = 500µA	Source	350	410	500	350	410	500	µA
	I_{OM}-		Sink	-350	-410	-500	-350	-410	-500	µA
	I_{OM}+	I_{ABC} = 5µA	Source	3	5	7	3	5	7	µA
	I_{OM}-		Sink	-7	-5	-3	-7	-5	-3	µA
Peak Output Current Sink and Source	I_{OM}-, I_{OM}+	I_{ABC} = 500µA, T_A=Full Temperature Range		350	450	550	350	450	550	µA
Linearization Diodes		I_D=100µA		-	10	-	-	10	-	µA
Offset Current	I_{IOD}	I_D=10µA		-	0,5	1	-	0,5	1	µA
Dynamic Impedance	Rdyn	I_D=100µA		-	700	-	-	700	-	Ω
Diode Network Supply Current	I_{SD}	I_{ABC} = 100µA		250	600	800	250	600	800	µA
Amplifier Supply Current (Per Amplifier)	I+	I_{ABC} = 500µA		-	2	2,5	-	2	2,5	mA
Amplifier Output Leakage Current	I_{OL}	I_{ABC} = 0, Vo = 0V		-	0,015	0,1	-	0,015	0,1	nA
		I_{ABC} = 0, Vo = 30V		-	0,15	1	-	0,15	1	nA
Common Mode Rejection Ratio		I_{ABC} = 100µA		80	100	-	80	100	-	dB
Power Supply Rejection Ratio	PSRR	I_{ABC} = 100µA		86	105	-	86	105	-	dB
Open Loop Voltage Gain	A_{OL}	I_{ABC} = 100µA,		50	100	-	50	100	-	kV/V
		R_L = ∞, V_o = $20V_{P-P}$		94	100	-	94	100	-	dB
Forward Transconductance	G_M	I_{ABC} = 50µA, Large Signal		-	0,8	1,2	-	0,8	1,2	mS
	g_M	I_{ABC} = 1mA, Small Signal		-	16	22	-	16	22	mS
Input Resistance	R_I	I_{ABC} = 10µA		0,5	-	-	0,5	-	-	MΩ
Channel Separation		f =1kHz		-	94	-	-	94	-	dB
Open Loop Total Harmonic Distortion	THD	f = 1kHz, I_{ABC}=1,5mA, R_L = 15kΩ, V_o =$20V_{P-P}$		-	0,4	-	-	0,4	-	%
Bandwidth	f_T	I_{ABC} = 1mA, R= 100Ω		-	9	-	-	9	-	MHz
Slew Rate, Open Loop	SR	I_{ABC} = 10mA		-	125	-	-	125	-	V/µs
Capacitance	C_I	I_{ABC} = 100µA	Input	-	4,5	-	-	4,5	-	pF
	C_O		Output	-	7,5	-	-	7,5	-	pF
Output Resistance	R_O	I_{ABC} = 100µA		-	63	-	-	63	-	MΩ

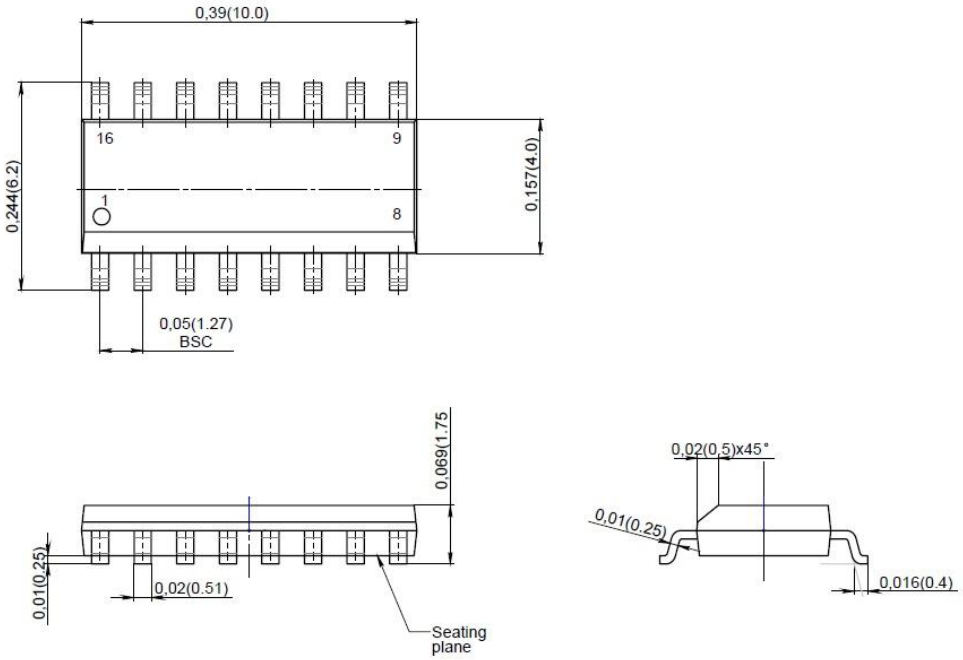
Device type	Package	Additional marking
AS3280	PDIP-16 (300mil)	----
AS3280 A	PDIP-16 (300mil)	white dot
AS3280 D	SOIC-16 (150mil)	----
AS3280 AD	SOIC-16 (150mil)	white dot

Units: inch (mm)

PDIP-16 (300 Mil)



SOIC-16 (150Mil)



Revision history

Date	Revision	Changes
04-Dec-2018	**1**	Initial version
09-Jul-2019	**2**	PDIP-16 – New package