

AS339/339A

LOW POWER LOW OFFSET VOLTAGE QUAD COMPARATORS

Description

The AS339/339A consist of four independent precision voltage comparators with a typical offset voltage of 2.0mV and high gain. They are specifically designed to operate from a single power supply over wide range of voltages. Operation from split power supply is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

The AS339/339A series are compatible with industry standard 339. The AS339A has more stringent input offset voltage than the AS339.

The AS339 is available in SO-14 and TSSOP-14 packages, and the AS339A is available in SO-14 package.

Features

- Wide Supply Voltage Range
 - Single Supply: 2.0V to 36V
 - Dual Supplies: ±1.0V to ±18V
- Low Supply Current Drain: 0.9mA
- Low Input Bias Current: 25nA (Typical)
- Low Input Offset Current: ±5.0nA (Typical)
- Low Input Offset Voltage: 2.0mV (Typical)
- Input Common Mode Voltage Range Includes Ground
- Differential Input Voltage Range Equals to the Power Supply Voltage
- Low Output Saturation Voltage: 200mV at 4mA
- Open Collector Output
- Lead-Free Packages: SO-14, TSSOP-14
 - Totally Lead-Free; RoHS Compliant (Notes 1 & 2)
- Lead-Free Packages, Available in "Green" Molding Compound: SO-14, TSSOP-14
 - Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
 - Halogen and Antimony Free. "Green" Device (Note 3)
- Notes: 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 - 2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 - 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Assignments



Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply
- DC-DC Module
- PC Motherboard
- Communication Equipment



Typical Applications Circuit





Basic Comparator





One Shot Multivibrator



Squarewave Oscillator



Functional Block Diagram



Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rati	Unit	
V _{CC}	Supply Voltage	40	V	
V _{ID}	Differential Input Voltage	40		V
V _{IN}	Input Voltage	-0.3 to	o 40	V
l _{iN}	Input Current (V _{IN} < -0.3V) (Note 5)	50		mA
_	Output Short-Circuit to Ground	Continuous		_
_		SO-14	890	
P _D	Power Dissipation ($T_A = +25^{\circ}C$)	TSSOP-14	790	mW
TJ	Operating Junction Temperature	+150		°C
T _{STG}	Storage Temperature Range	-65 to +150		°C
T _{LEAD}	Lead Temperature (Soldering, 10 Seconds)	+26	°C	

Notes: 4. Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

5. This input current will only exist when the voltage at any of the input leads is driven negative. It is due to the collector-base junction of the input PNP transistors becoming forward biased and thereby acting as input diode clamps. In addition to this diode action, there is also lateral NPN parasitic transistor action on the IC chip. This transistor action can cause the output voltages of the comparators to go to the V+ voltage level (or to ground for a large overdrive) for the time duration that an input is driven negative. This is not destructive and normal output states will re-establish when the input voltage, which was negative, again returns to a value greater than -0.3 V_{DC} (at +25°C).



Recommended Operating Conditions

Symbol	Parameter	Min	Мах	Unit
V _{CC}	Supply Voltage	2	36	V
T _A	Operating Temperature Range	-40	+85	°C

Electrical Characteristics (Limits in standard typeface are for $T_A = +25^{\circ}$ C, **bold** typeface applies over $T_A = -40^{\circ}$ C to +85°C (Note 6), V_{CC} = 5V, GND = 0V, unless otherwise specified.)

Parameter	Conditions		Min	Тур	Мах	Unit
	$V_0 = 1.4V, R_S =$ $0\Omega, V_{CC}$ from 5V to 30V	AS339	—	2	5	mV
hand Offerst Maller			_	_	7	
Input Offset Voltage		AS339A	_	2	3	
			_	_	5	
Lagut Diag Current	I_{IN} + or I_{IN} - with output in Linear Range, V_{CM} = 0V		_	25	250	nA
Input Blas Current			_	_	400	
			_	5.0	50	
Input Offset Current	I_{IN} + - I_{IN} -, V_{CM} = 0V		_	_	200	nA
Input Common Mode Voltage Range (Note 7)	V _{CC} = 30V		0	_	V _{CC} -1.5	V
	RL = ∞	V _{CC} = 5V	_	0.9	2.0	mA
			_	_	3.0	
Supply Current		V _{CC} = 30V	—	1.2	2.5	
			_	—	3.5	
Voltage Gain	$R_L \ge 15k\Omega$, $V_{CC} = 15V$, $V_O = 1V$ to 11V		50	200	_	V/mV
Large Signal Response Time	V_{IN} = TTL Logic Swing, V_{REF} = 1.4V V_{RL} = 5V, R_L = 5.1k Ω		_	200	_	ns
Response Time	$V_{RL} = 5V, R_L = 5.1k\Omega$		_	1.3	_	μs
Output Sink Current	$V_{IN} = 1V, V_{IN} = 0,$	V _O = 1.5V	6.0	16	—	mA
	V_{IN} = 0V, V_{IN} + = 1V, V_O = 5V		_	0.1	_	nA
Output Leakage Current	$V_{IN} = 0V, V_{IN} = 1V, V_0 = 30V$		_	_	1	μA
	V _{IN} - = 1V, V _{IN} + = 0, I _{SINK} ≤ 4mA		_	200	400	mV
Saturation Voltage			—	_	500	
	SO-14		_	15	_	°C/W
Thermal Resistance (Junction to Case)	TSSOP-14		_	6	_	
Thermal Desistence (Institute to Architect)	SO-14		_	89	_	
Thermal Resistance (Junction to Ambient)	TSSOP-14			125		

Notes: 6. Limits over the full temperature are guaranteed by design, but not tested in production.

> 7. The input common-mode voltage of either input signal voltage should not be allowed to go negatively by more than 0.3V (at +25°C). The upper end of the common-mode voltage range is V_{CC} -1.5V (at +25°C), but either or both inputs can go to +36V without damages, independent of the magnitude of the Vcc.



Performance Characteristics



Supply Voltage vs. Supply Current

Supply Voltage vs. Input Bias Current



Output Sink Current vs. Saturation Voltage







Response Time for 5mV Input Overdrive -Negative Transition





Ordering Information



	Part Number	Package (Note 9)	RoHS Compliant Lead Free / Green	Marking ID	Packing	Quantity	Status (Note 8)	Alternative
Lead-Free	AS339M-E1	SO-14	Lead Free	AS339M-E1	Tube	NA	End of Life	AS339MTR-G1
Lead-Free	AS339MTR-E1	SO-14	Lead Free	AS339M-E1	Tape & Reel	2500	NRND	AS339MTR-G1
Lead-Free	AS339AM-E1	SO-14	Lead Free	AS339AM-E1	Tube	NA	End of Life	AS339AMTR-G1
Lead-Free	AS339AMTR-E1	SO-14	Lead Free	AS339AM-E1	Tape & Reel	2500	NRND	AS339AMTR-G1
Lead-Free Green	AS339M-G1	SO-14	Green	AS339M-G1	Tube	NA	End of Life	AS339MTR-G1
Lead-Free Green	AS339MTR-G1	SO-14	Green	AS339M-G1	Tape & Reel	2500	In Production	_
Lead-Free Green	AS339AM-G1	SO-14	Green	AS339AM-G1	Tube	NA	End of Life	AS339AMTR-G1
Pb,	AS339AMTR-G1	SO-14	Green	AS339AM-G1	Tape & Reel	2500	In Production	
Lead-Free	AS339GTR-E1	TSSOP-14	Lead Free	EGS339	Tape & Reel	2500	NRND	AS339GTR-G1
Lead-Free Green	AS339GTR-G1	TSSOP-14	Green	GGS339	Tape & Reel	2500	In Production	

Notes: 8. All variants in Tube packing with package SO-14 are End of Life. All variants with package DIP-14 are End of Life without replacements.

NRND: Not Recommended for New Design.

9. For packaging details, go to our website at: https://www.diodes.com/design/support/packaging/diodes-packaging/.



Marking information

(1) SO-14



First Line: Logo and Marking ID (See Ordering Information) Second Line: Date Code Y: Year WW: Work Week of Molding A: Assembly House Code XX: 7th and 8th Digits of Batch Number

(2) TSSOP14



First Line: Logo and Marking ID (See Ordering Information) Second Line: Date Code Y: Year WW: Work Week of Molding A: Assembly House Code XX: 7th and 8th Digits of Batch Number



Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: SO-14



Note: Eject hole, oriented hole and mold mark is optional.



Package Outline Dimensions (Cont. All dimensions in mm(inch).)

(2) Package Type: TSSOP-14



Note: Eject hole, oriented hole and mold mark is optional.



Suggested Pad Layout

(1) Package Type: SO-14



Dimensions	Z	G	X	Y	E
	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)
Value	6.900/0.272	3.900/0.154	0.650/0.026	1.500/0.059	1.270/0.050



Suggested Pad Layout (Cont.)

(2) Package Type: TSSOP-14



Dimensions	Z	G	X	Y	E
	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)
Value	7.720/0.304	4.160/0.164	0.420/0.017	1.780/0.070	0.650/0.026



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