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 DIP-14, SOIC-14 and TSSOP-14 packages, and the AS339A is available in SOIC-14 package.

Features

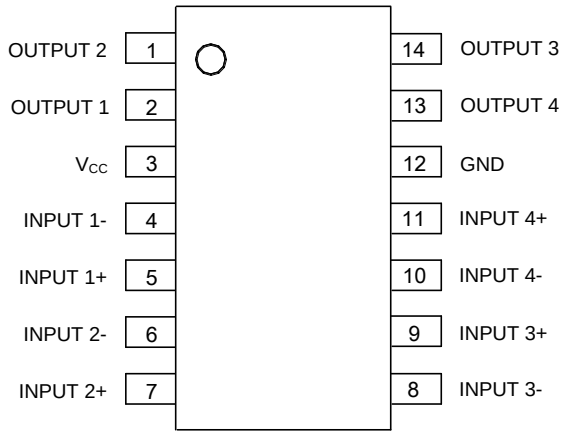
- Wide Supply Voltage Range
  - Single Supply: 2.0V to 36V
  - Dual Supplies: ±1.0V to ±18V
- Low Supply Current Drain: 0.9mA
- Low Input Bias Current: 25nA (Typical)
- Low Input Offset Current: ±5.0nA (Typical)
- Low Input Offset Voltage: 2.0mV (Typical)
- Input Common Mode Voltage Range Includes Ground
- Differential Input Voltage Range Equals to the Power Supply Voltage
- Low Output Saturation Voltage: 200mV at 4mA
- Open Collector Output

Applications

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

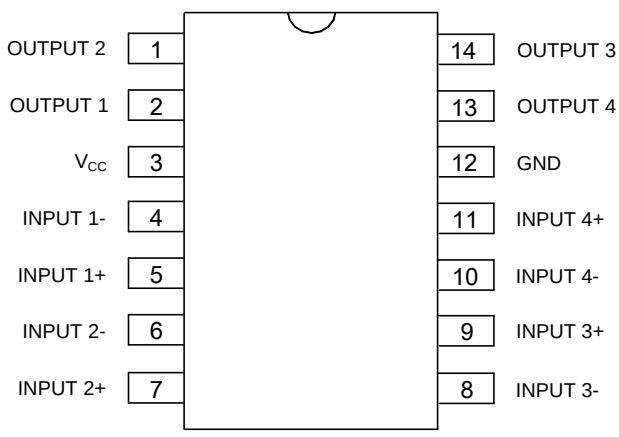
Pin Assignments

(Top View)



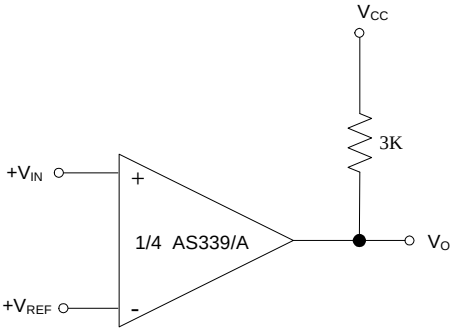
(SOIC-14/ M Package / TSSOP-14/ G Package)

(Top View)

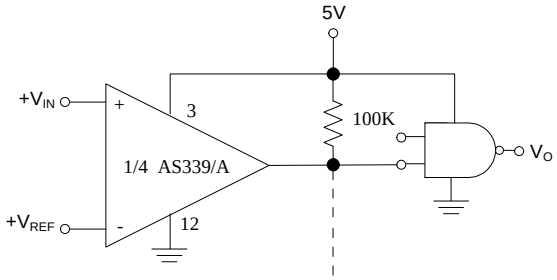


(DIP-14/ P Package)

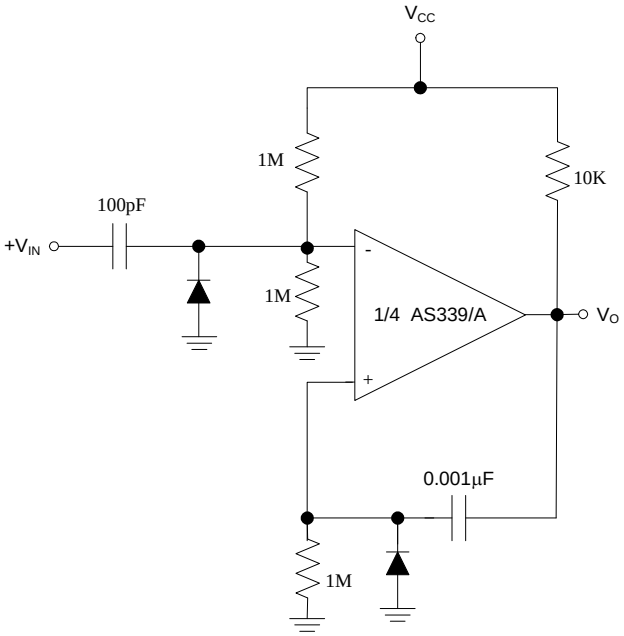
Typical Applications Circuit



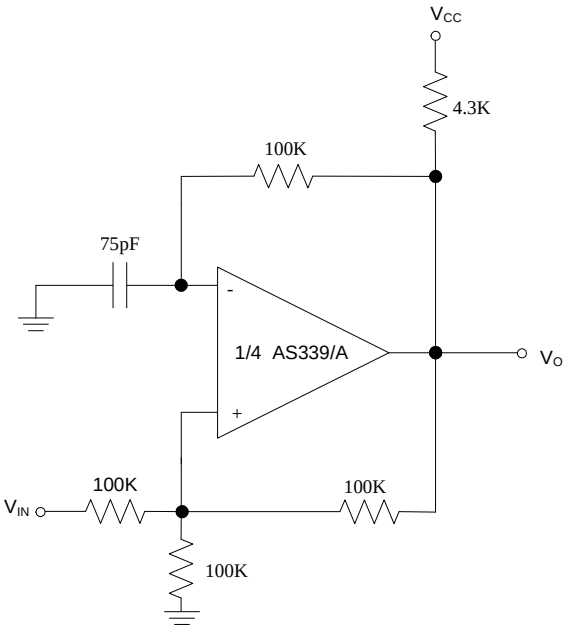
Basic Comparator



Driving CMOS

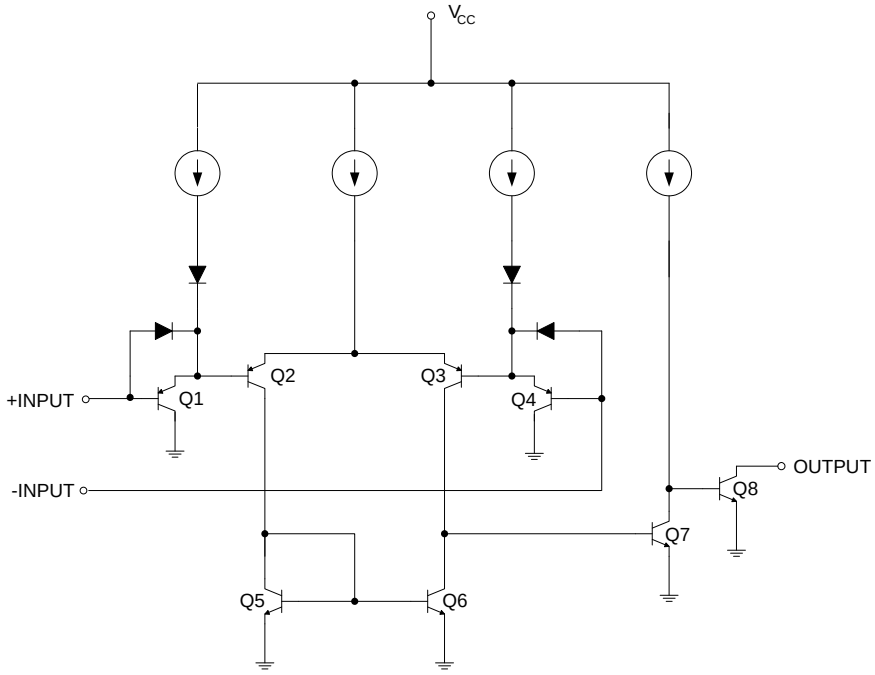


One Shot Multivibrator



Squarewave Oscillator

Functional Block Diagram



Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Rating		Unit
V_{CC}	Supply Voltage	40		V
V_{ID}	Differential Input Voltage	40		V
V_{IN}	Input Voltage	-0.3 to 40		V
I_{IN}	Input Current (V_{IN} < -0.3V) (Note 2)	50		mA
–	Output Short-Circuit to Ground	Continuous		–
P_D	Power Dissipation (T_A = +25°C)	DIP-14	1050	mW
		SOIC-14	890	
		TSSOP-14	790	
T_J	Operating Junction Temperature	+150		°C
T_{STG}	Storage Temperature Range	-65 to +150		°C
T_{LEAD}	Lead Temperature (Soldering, 10 Seconds)	+260		°C

Notes:
1. 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.
2. 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	Max	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°C, **bold** typeface applies over T_A = -40°C to +85°C (Note 3), V_{CC} = 5V, GND = 0V, unless otherwise specified.)

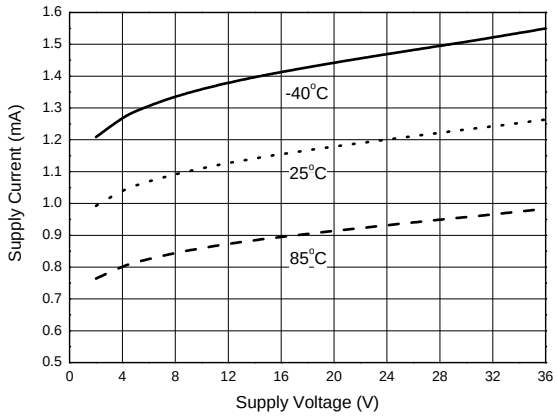
Parameter	Conditions		Min	Typ	Max	Unit
Input Offset Voltage	V_O = 1.4V, R_S = 0Ω, V_{CC} from 5V to 30V	AS339	–	2	5	mV
			–	–	**7**	
		AS339A	–	2	3	
			–	–	**5**	
Input Bias Current	I_{IN}+ or I_{IN}- with output in Linear Range, V_{CM} = 0V		–	25	250	nA
			–	–	**400**	
Input Offset Current	I_{IN}+ - I_{IN}-, V_{CM} = 0V		–	5.0	50	nA
			–	–	**200**	
Input Common Mode Voltage Range (Note 4)	V_{CC} = 30V		0	–	V_{CC}-1.5	V
Supply Current	R_L = ∞	V_{CC} = 5V	–	0.9	2.0	mA
			–	–	**3.0**	
		V_{CC} = 30V	–	1.2	2.5	
			–	–	**3.5**	
Voltage Gain	R_L ≥ 15kΩ, 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 = 5.1kΩ		–	200	–	ns
Response Time	V_{RL} = 5V, R_L = 5.1kΩ		–	1.3	–	µs
Output Sink Current	V_{IN}- = 1V, V_{IN}+ = 0, V_O = 1.5V		6.0	16	–	mA
Output Leakage Current	V_{IN}- = 0V, V_{IN}+ = 1V, V_O = 5V		–	0.1	–	nA
	V_{IN}- = 0V, V_{IN}+ = 1V, V_O = 30V		–	–	**1**	µA
Saturation Voltage	V_{IN}- = 1V, V_{IN}+ = 0, I_{SINK} ≤ 4mA		–	200	400	mV
			–	–	**500**	
Thermal Resistance (Junction to Case)	SOIC-14		–	51.93	–	°C/W
	DIP-14		–	35.00	–	

Notes: 3. Limits over the full temperature are guaranteed by design, but not tested in production.

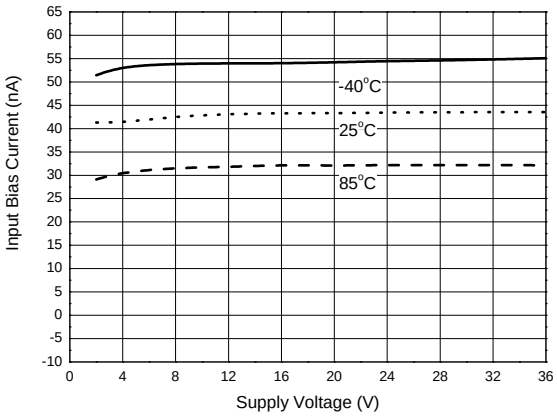
4. The input common-mode voltage of either input signal voltage should not be allowed to go negatively by more than 0.3V (at +25°C). The upper end of the common-mode voltage range is V_{CC} -1.5V (at +25°C), but either or both inputs can go to +36V without damages, independent of the magnitude of the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

Performance Characteristics

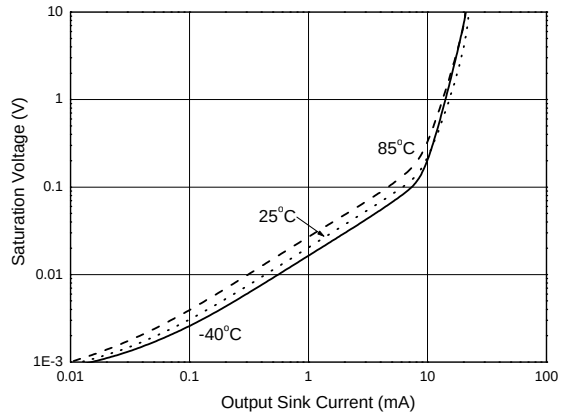
Supply Voltage vs. Supply Current



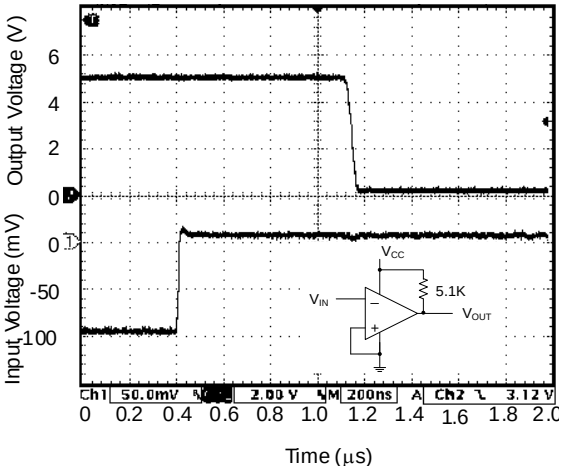
Supply Voltage vs. Input Bias Current



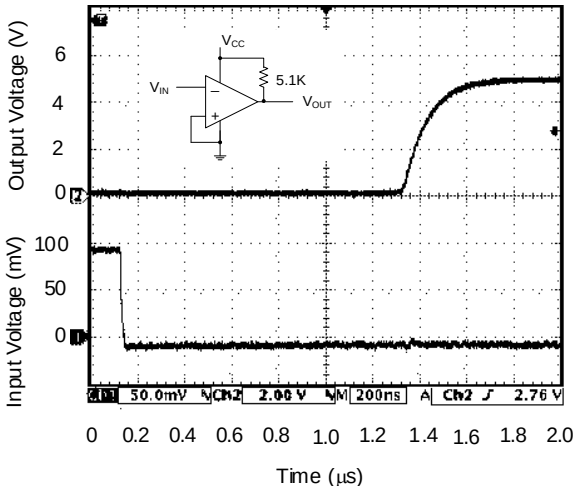
Output Sink Current vs. Saturation Voltage



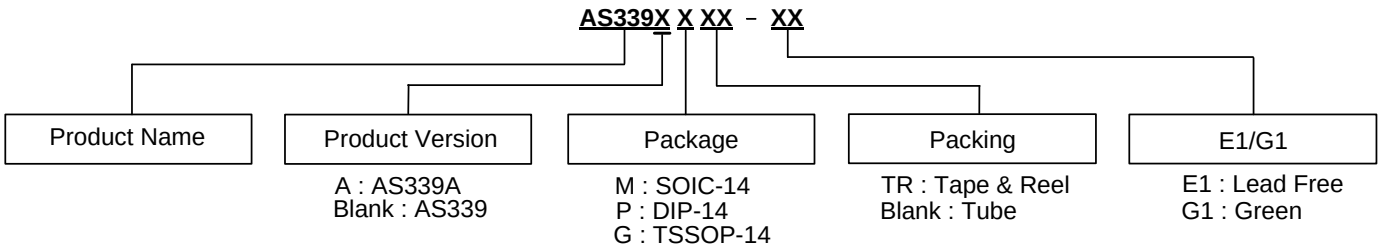
Response Time for 5mV Input Overdrive - Negative Transition



Response Time for 5mV Input Overdrive - Positive Transition



Ordering Information



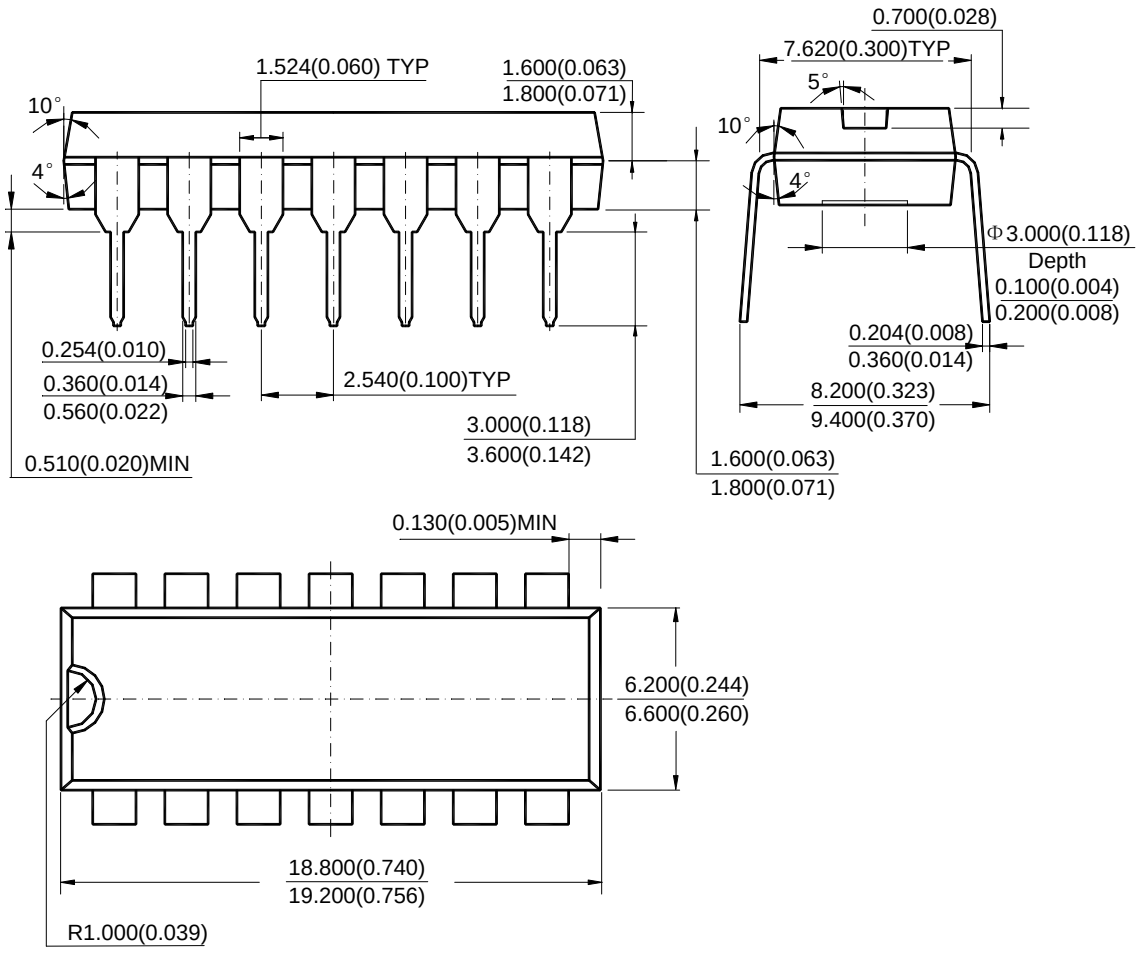
BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

Products with "G1" suffix are available in green packages.

Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
SOIC-14	-40°C to +85°C	AS339M-E1	AS339M-G1	AS339M-E1	AS339M-G1	Tube
		AS339MTR-E1	AS339MTR-G1	AS339M-E1	AS339M-G1	Tape & Reel
		AS339AM-E1	AS339AM-G1	AS339AM-E1	AS339AM-G1	Tube
		AS339AMTR-E1	AS339AMTR-G1	AS339AM-E1	AS339AM-G1	Tape & Reel
DIP-14		AS339P-E1	AS339P-G1	AS339P-E1	AS339P-G1	Tube
TSSOP-14		AS339GTR-E1	AS339GTR-G1	EGS339	GGS339	Tape & Reel

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

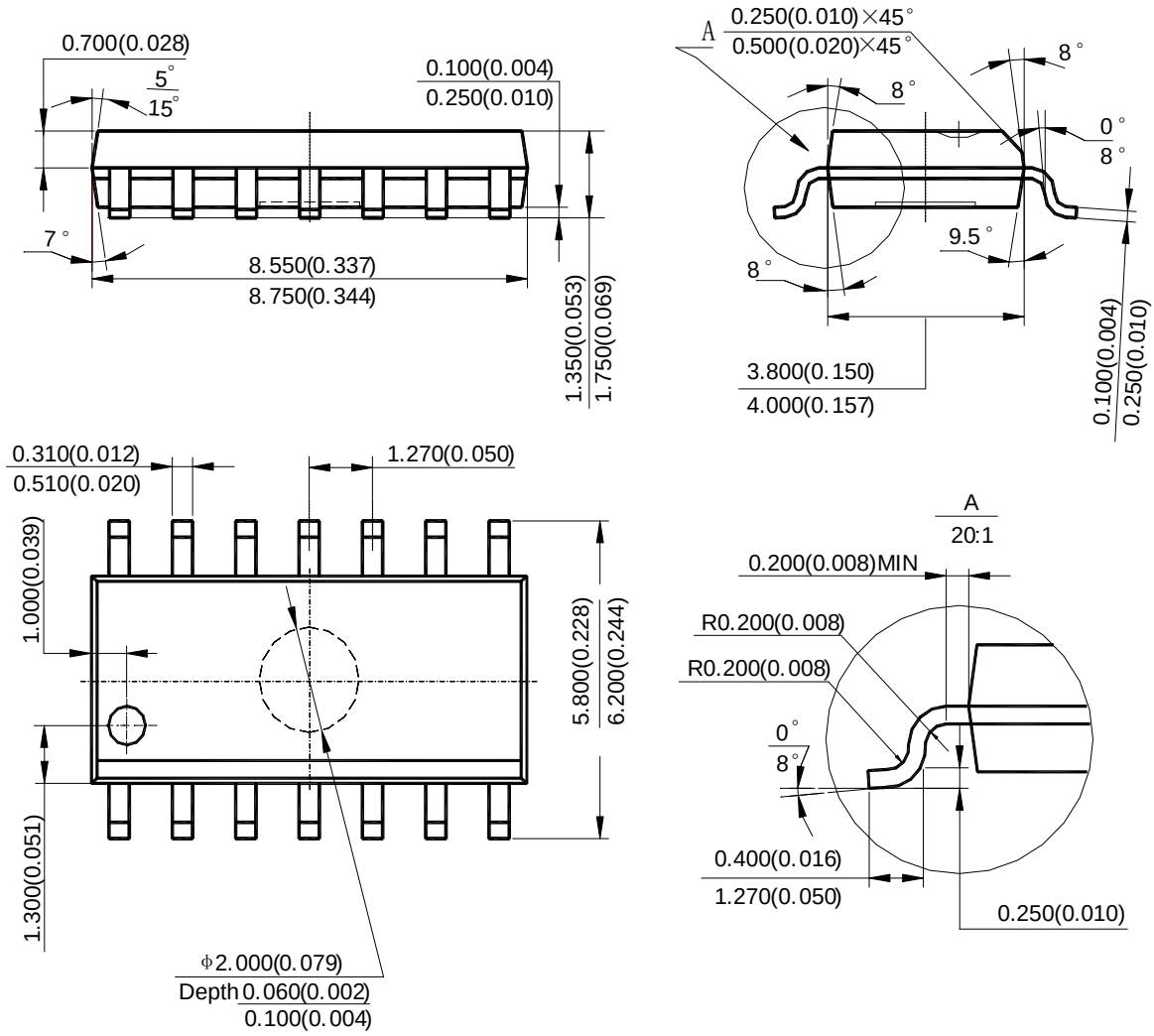
(1) Package Type: DIP-14



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

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

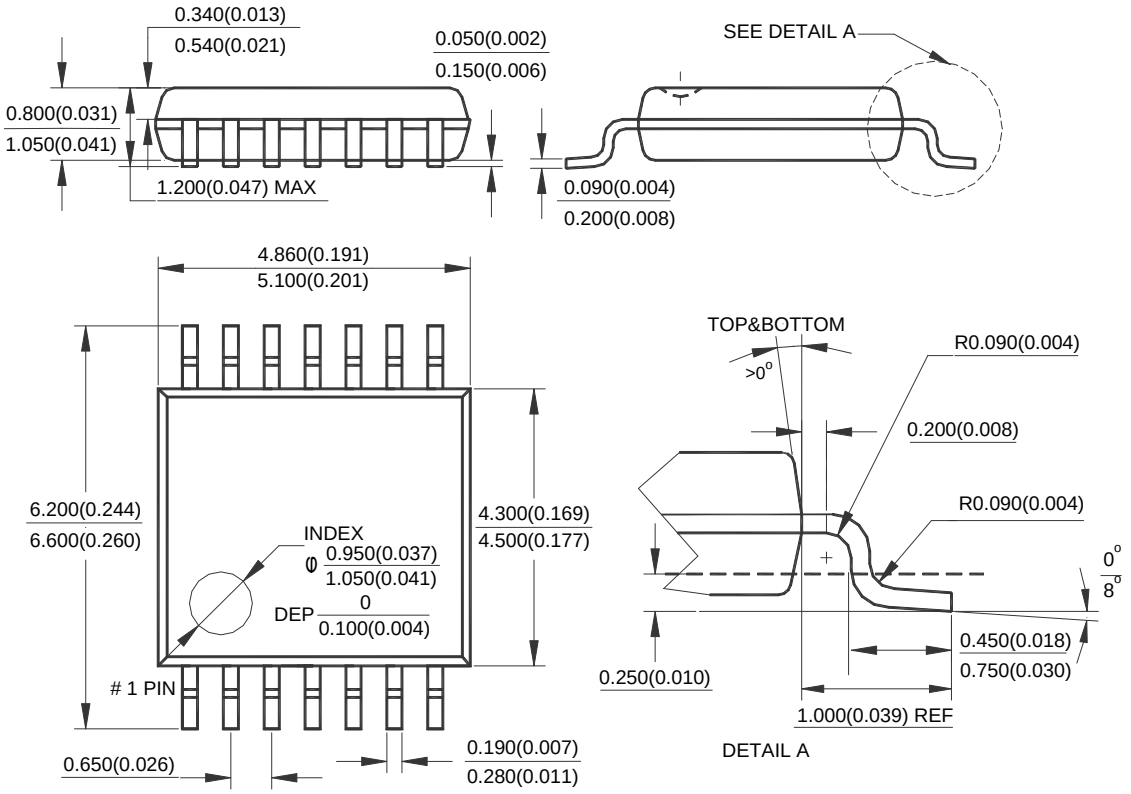
(2) Package Type: SOIC-14



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

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

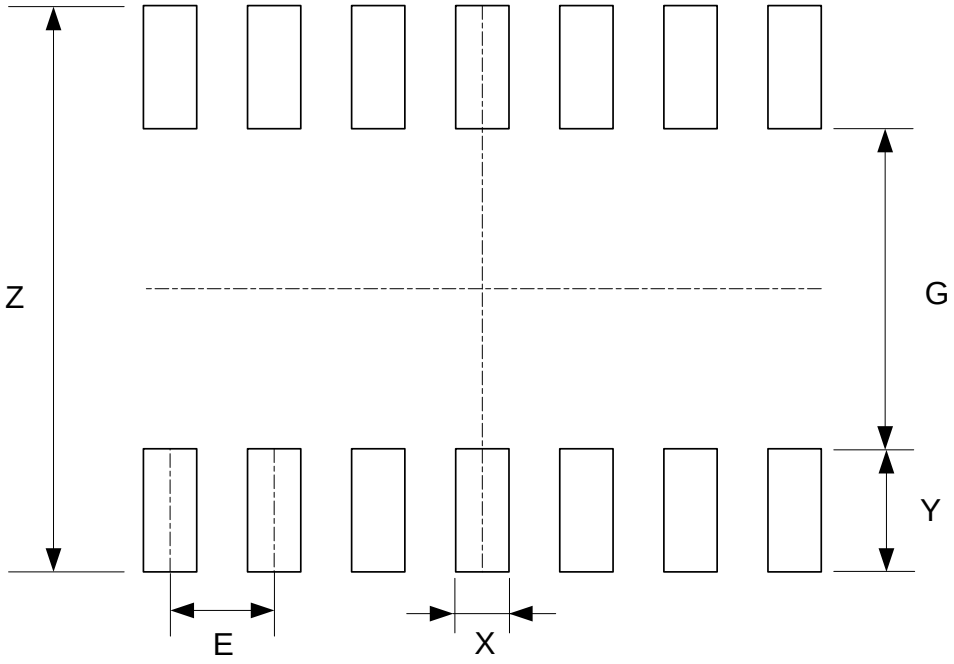
(3) Package Type: TSSOP-14



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

Suggested Pad Layout

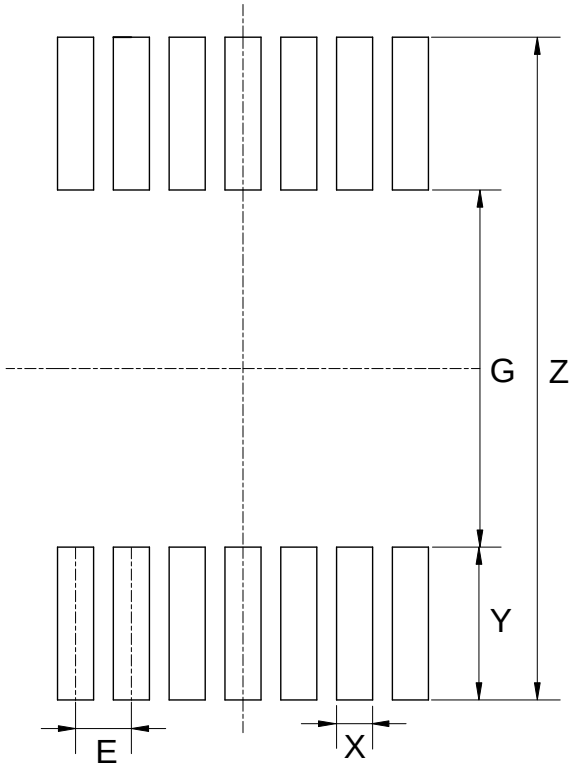
(1) Package Type: SOIC-14



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (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 (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (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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