Low Power Offset Voltage Quad Comparator

Description

The PD339 series consists of four independent precision voltage comparators with an offset voltage specification as low as 2mV. These comparators have a unique characteristic in that the input common-mode voltage range includes ground, even though operated from a single power supply voltage. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

The PD339 series can be widely used in such applications as battery charger, cordless telephone, switching power supply, DC-DC module and PC motherboard.

The PD339 series are available in 2 Packages: DIP-14 and SOIC-14.

Feature

- Wide Supply Voltage Range
  -Single Supply: 2.0V to 36V
  -Dual Supplies: ±1.0V to ±18V
- Very Low Supply Current Drain:0.8mA
  -Independent of Supply Voltage
- Low Input Bias Current:25nA(Typical)
- Low Input Offset Current: ±5nA(Typical)
- Low Input Offset Voltage: ±2mV(Typical)
- Input Common Mode Voltage Range Includes Ground
- Differential Input Voltage Range Equals to the Power Supply Voltage
- Low Output Saturation Voltage:250mV at 4mA
- Open Collector Output

Application

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

DIP-14

SOIC-14

Figure 1. Package Types of PD339

Pin Configuration

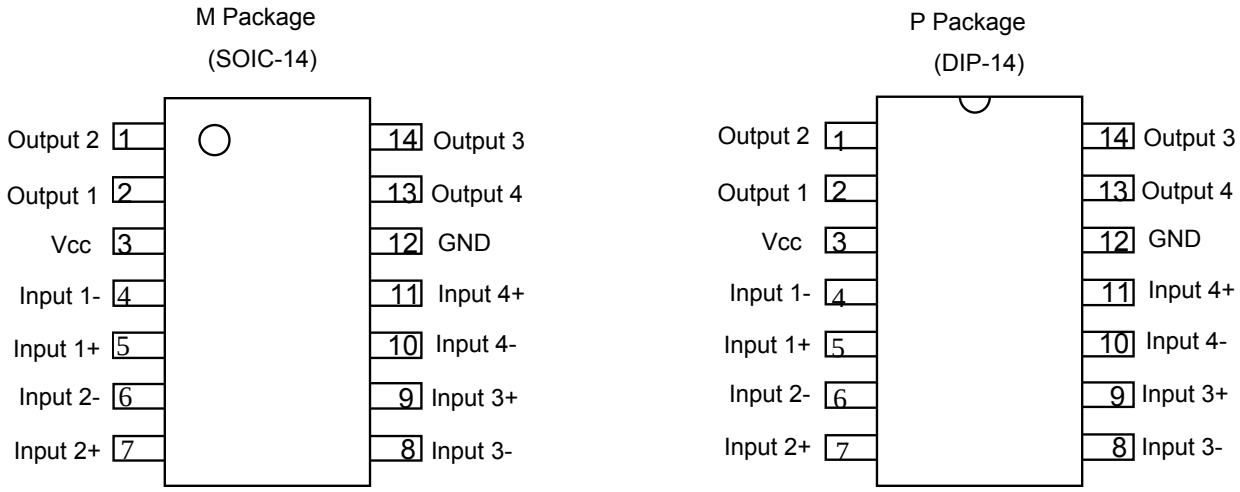


Figure 2. Pin Configuration of PD339(Top View)

Functional Block Diagram

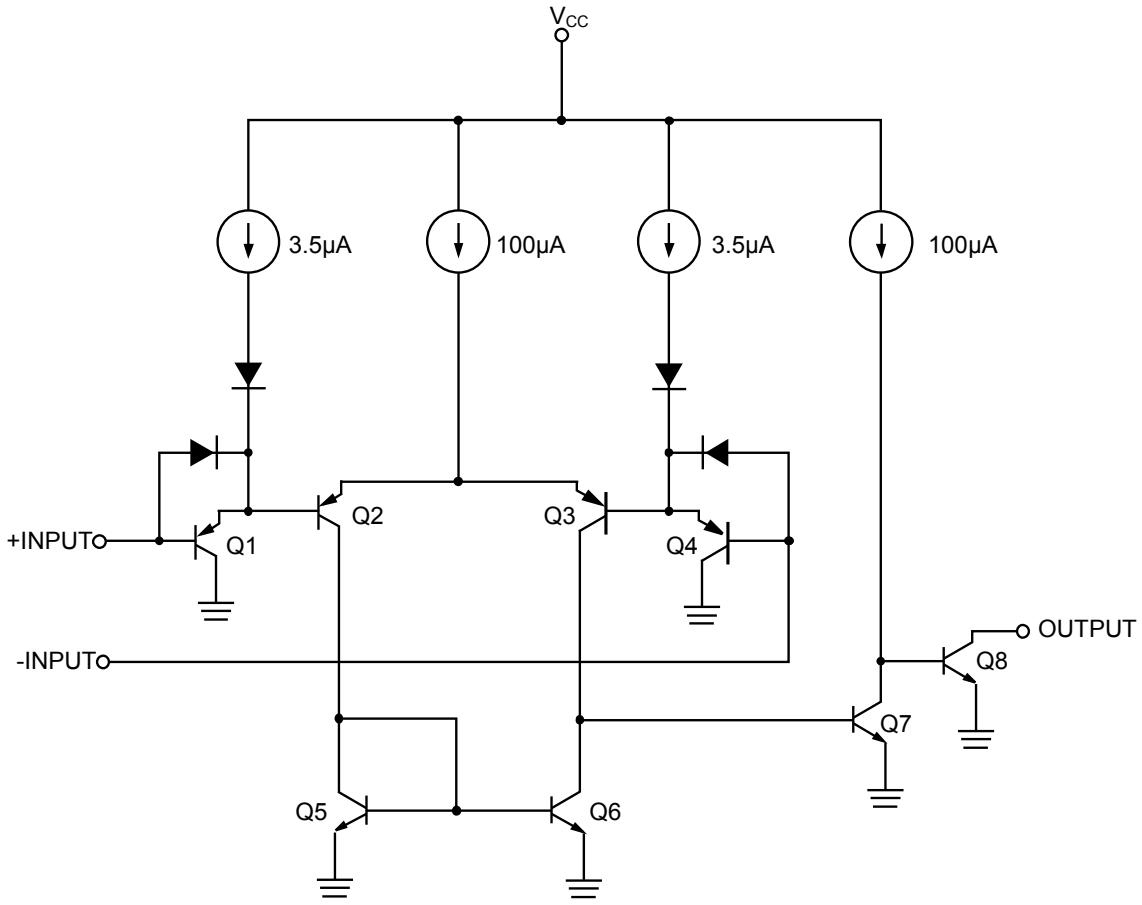


Figure 3. Functional Block Diagram of PD339
(Each Comparator)

Absolute Maximum Ratings(Note1)

Parameter	Symbol	Value		Unit
Supply Voltage	V_{CC}	36		V
Differential Input Voltage	V_{ID}	36		V
Input Voltage	V_{IN}	-0.3 to 36		V
Input Current(V_{IN}<-0.3V)(Note 2)	I_{IN}	50		mA
Power Dissipation(T_A=25℃)	P_D	DIP-14	1050	mW
		SOIC-14	890	
Output Short Circuit to Ground		Continuous		
Operating Junction Temperature	T_J	150		℃
Storage Temperature Range	T_{STG}	-65 to 150		℃
Lead Temperature (Soldering,10 Seconds)	T_{LEAD}	260		℃

Note 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.

Note 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℃).

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	2	37	V
Operating Temperature Range	T_A	-40	85	℃

Electrical Characteristics

(V_{CC}=5V,GND=0V ,T_A=25℃,unless otherwise specified.)

Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Offset Voltage	(Note 3)		2.0	5.0	mV
Input Bias Current	I_{IN}+ or I_{IN}- with output in linear range, V_{CM}=0V,(Note 4)		25	250	nA
Input Offset Current	I_{IN}+ or I_{IN}-, V_{CM}=0V		5.0	50	nA
Input Common Mode Voltage Range	V_{CC}=15V(Note 5)	0		V_{CC}-1.5	V
Supply Current	R_L=∞,V_{CC}=5V		0.8	2.0	mA
	R_L=∞,V_{CC}=36V		1.0	2.5	
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=5.1 KΩ		300		ns
Response Time	V_{RL}=5V,R_L=5.1 KΩ,(Note 6)		1.3		μs
Output Sink Current	V_{IN}-=1V,V_{IN}+=0,V_O≤1.5V	6.0	16		mA
Saturation Voltage	V_{IN}-=1V,V_{IN}+=0,I_{SINK}≤4mA		250	400	mV
Output Leakage Current	V_{IN}-=0V,V_{IN}+=1V,V_O=5V		0.1		nA
Thermal Resistance(Junction to Case)	DIP-14		40.60		℃/W
	SOIC-14		60.24		

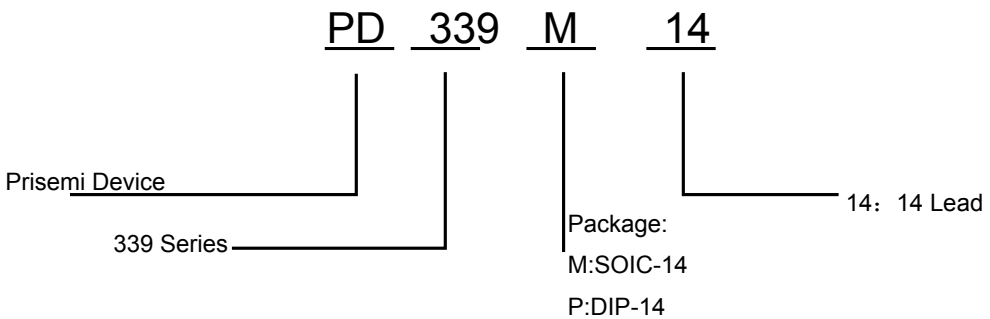
Note 3: At output switch point, V_O=1.4V, R_S=0 with V_{CC} from 5V to 30V, and over the full common-mode range (0V to V_{CC}-1.5V), at 25℃.

Note 4: The direction of the input current is out of the PNP input stage. This current is essentially constant, independent of the state of the output, so no loading charge exists on the reference of input lines.

Note 5: The input common-mode voltage of either input signal voltage should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is V_{CC}-1.5V, but either or both inputs can go to +18V without damage, independent of the magnitude of V_{CC}.

Note 6: The response time specified is a 100mV input step with 5mV overdrive. For large overdrive signals 300ns can be obtained.

Naming Rule



Typical Performance Characteristics

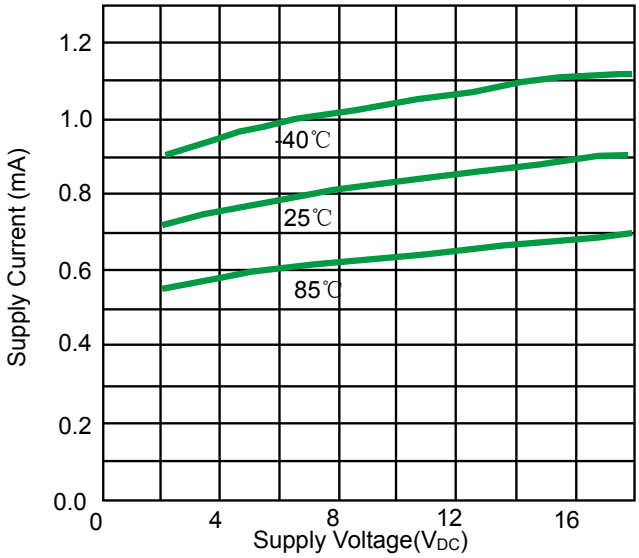


Figure 4. Supply Voltage vs. Supply Current

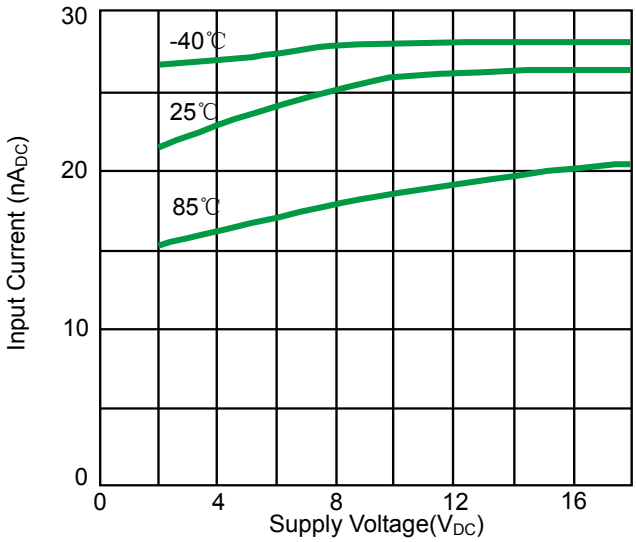


Figure 5. Supply Voltage vs. Input Current

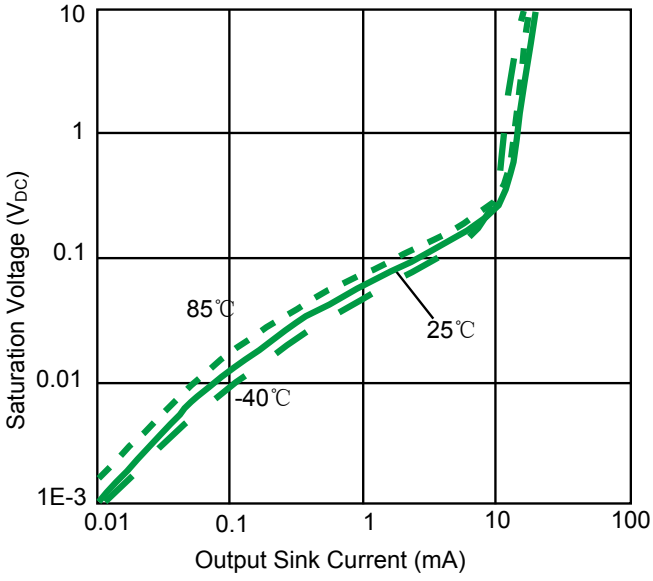


Figure 6. Output Sink Current vs. Saturation Voltage

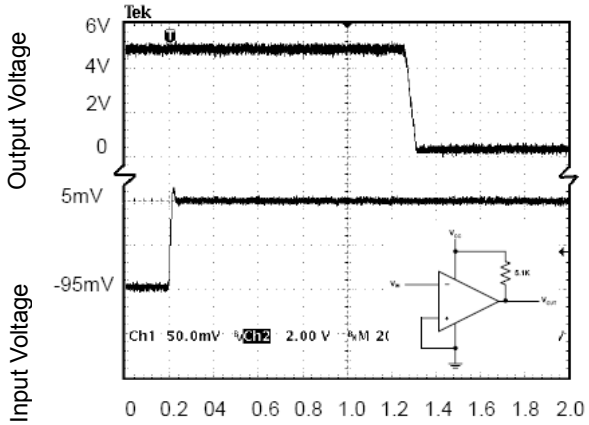


Figure 7. Response Time for 5mV Input Overdrive-Negative Transition

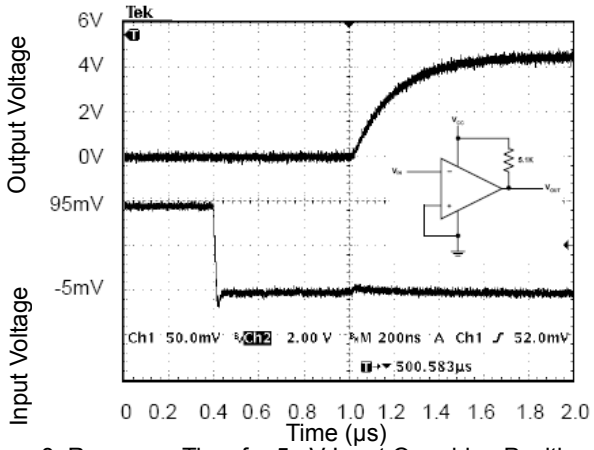


Figure 8. Response Time for 5mV Input Overdrive-Positive Transition

Typical Application

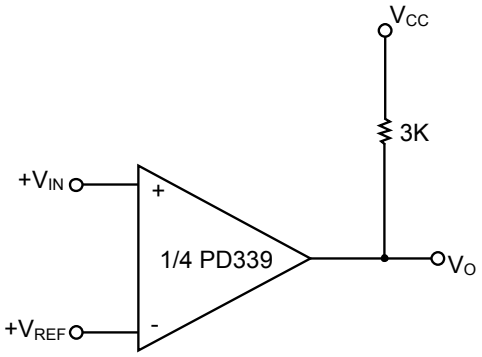


Figure 9. Basic Comparator

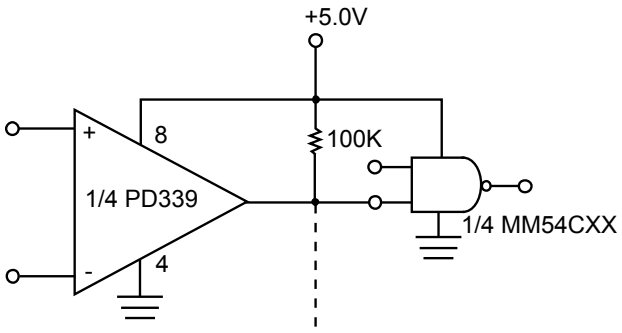


Figure 10. Driving CMOS/TTL

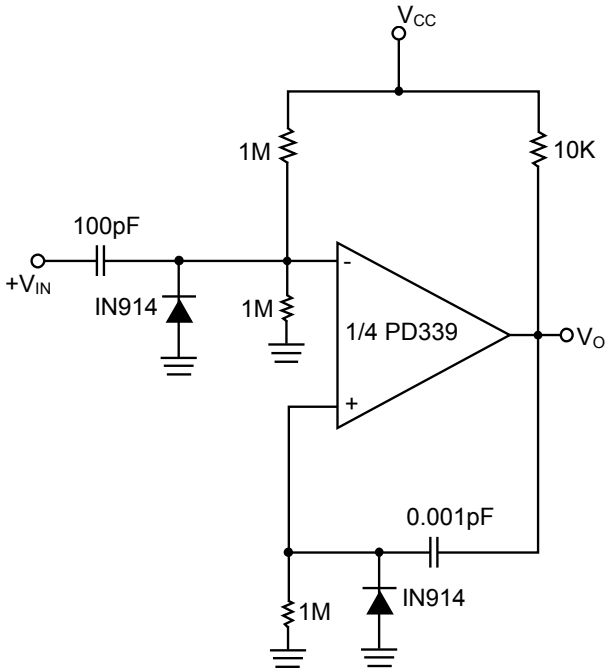


Figure 11. One Shot Multivibrator

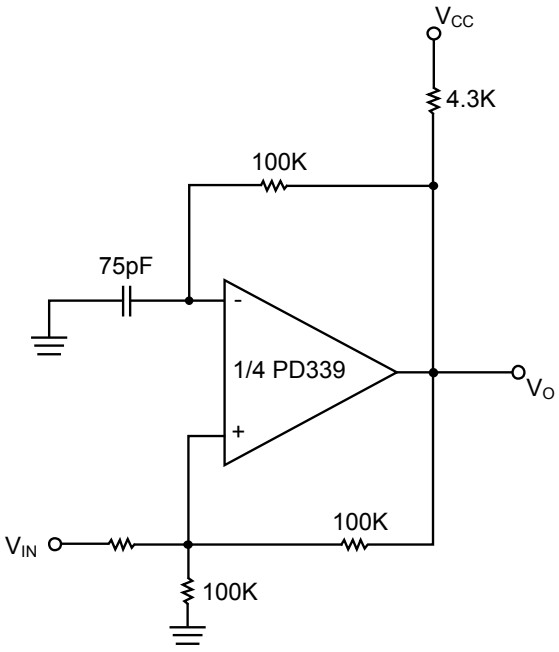
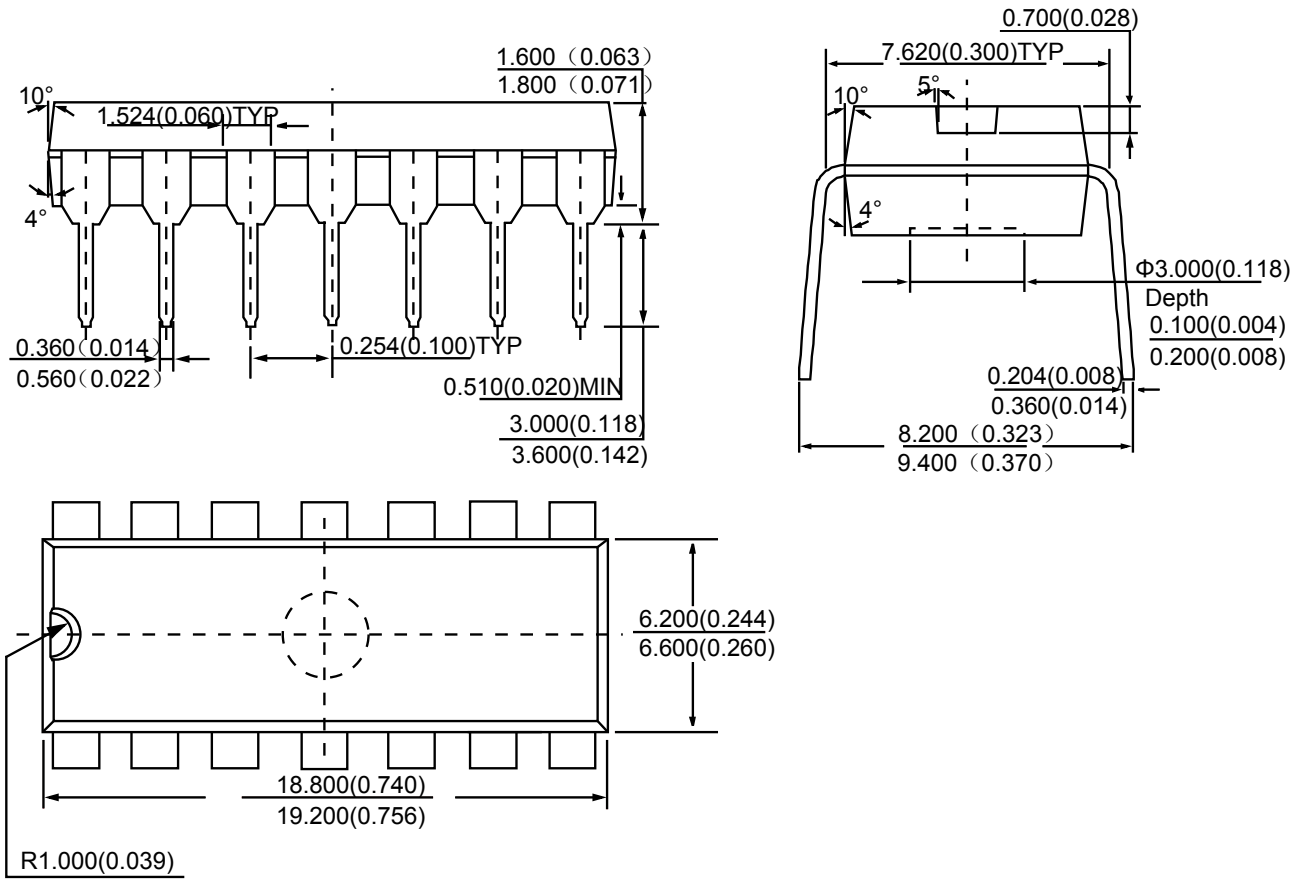


Figure 12. Squarewave Oscillator

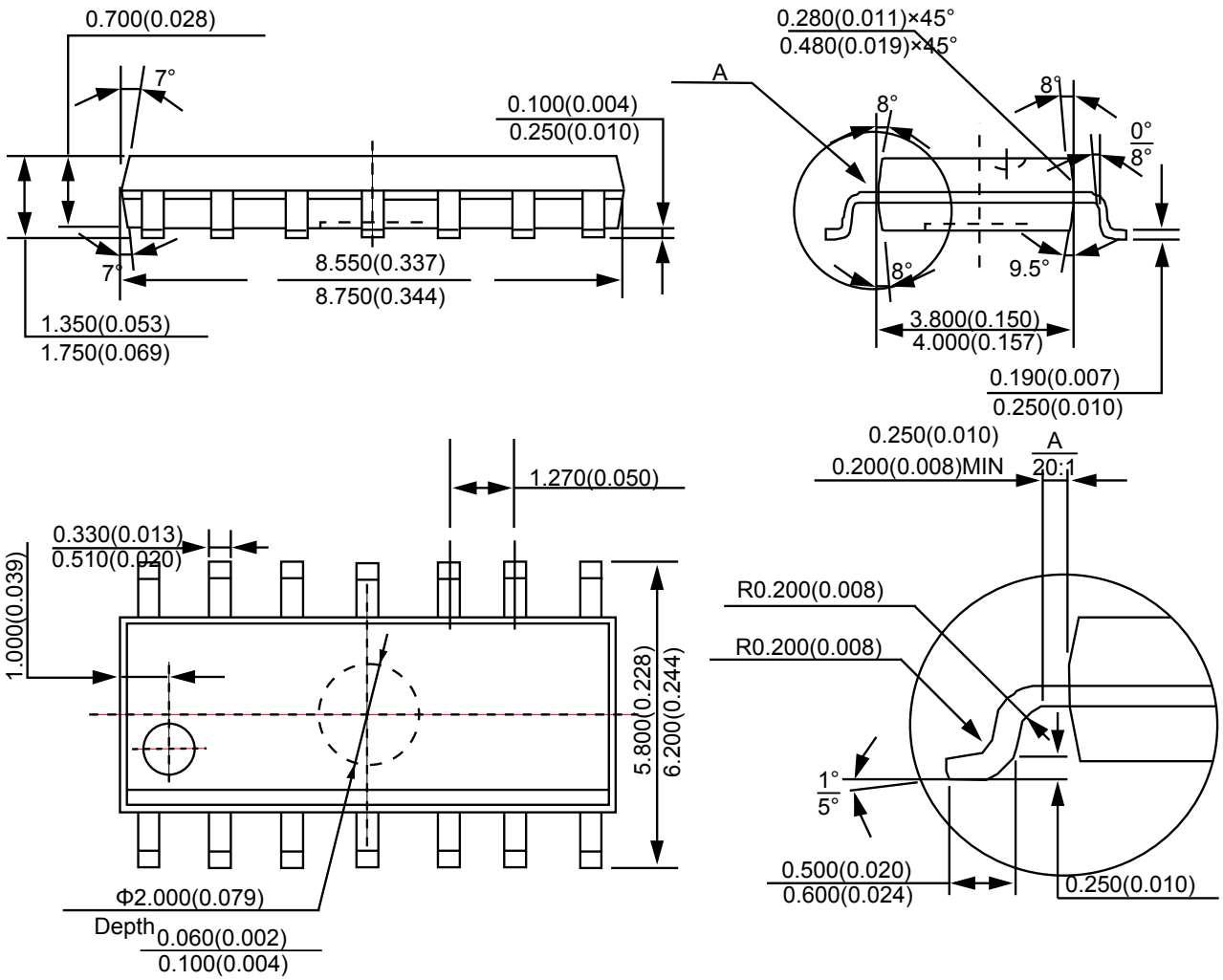
Product dimension (DIP-14)

Unit:mm(inch)



Product dimension (SOIC-14)

Unit:mm(inch)



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