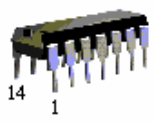
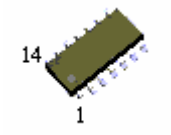
Quad Voltage Compartor

The comparator is designed for use in level detection, low level sensingand memory application in Consumer Automotive and industria electronic applications.

DIP-14 SOP-14





Pin : 1. Output 2 8. –Input 3
2. Output 1 9. +Input 3
3. Vcc 10. –Input 4
4. –Input 1 11. +Input 4
5. +Input 1 12. Gnd
6. –Input 2 13. Output 4
7. +Input 2 14. Output 3

FEATURES

Single or Spit Supply Operation

- Low input bnias current - 25 nA(T_{YP})
- Low input offset current - ± 5.0 nA(T_{YP})
- Low input offset voltage - ± 1.0 mV (T_{YP})
- Input common-made voltage range to gnd
- Low output saturation voltage - 130mV(T_{YP}) @4.0mA

TTL and CMOS compatible

ORDERING INFORMATION

Device	Operating Temperature	Package
PJ339CS	-20℃～+85℃	SOP-14
PJ339CD		DIP-14

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	+36 or ±18	Vdc
Input Differential Voltage Range	V_{IDR}	36	Vdc
Input Common Mode Voltage Range	V_{ICR}	-0.3 to V_{CC}	Vdc
Output Short-Circuit to Gnd (Note1)	I_{SC}	Continuous	mA
Input Current(Vin -0.3 Vdc) (Note2)	I_{in}	50	mA
Power Dissipation@T_A=25℃	P_D		
Ceramic Package		1.0	Watts
Derate above 25℃		8.0	mW/°C
Plastic Package		1.0	Watts
Derate above 25 ℃		8.0	mW/°C
Storage Temperature Range	T_{stg}	-65 to+150	℃

ELECTRICAL CHARACTERISTICS (V_{CC}= 5.0Vdc,T_A= 25 ℃ unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Input offset voltage (Note 3)	V_{IO}	--	+2.0	+5.0	mVdc
Input Bias Current (Note 3,4) (Output in Linear Range)	I_{IB}	--	25	250	nA
Input Offset Current (Note 3)	I_{IO}	--	± 5.0	± 50	nA
Input Common-Mode Voltage Range (Note 6)	V_{ICR}	0	--	V_{CC} -1.5	V
Supply Current $R_L = \infty$ (For All Comparators) $R_L = \infty$, V_{CC} =30Vdc	I_{CC}	 -- --	 0.8 --	 2.0 --	mA
Voltage Gain $R_L \geq 15K\Omega$, V_{CC} = 15Vdc	A_V	--	200	--	V/mV
Large Signal Response Time V1 = TTL logic Swing, V_{ref} = 1.4 Vdc, V_{RL} = 5.0Vdc, RL = 5.1 KΩ	--	--	300	--	ns
Response Time (Note 6) V_{RL} = 5.0 Vdc, R_L =5.1 KΩ	--	--	1.3	--	μs
Output Sink Current $V_I(-) \geq +1.0$ Vdc, $V_I(+) = 0$, $V_O \leq 15$Vdc	I_{sink}	6.0	16	--	mA
Saturation Voltage $V_I(-) \geq +1.0$ Vdc, $V_I(+) = 0$, $I_{sink} \leq 4.0$ mA	V_{sat}	--	130	400	mV
Output Leakage Current $V_I(+) \geq +1.0$ Vdc, $V_I(-) = 0$, V_O =+5.0Vdc	I_{OL}	--	0.1	--	nA
Input Offset Voltage (Note 3) T_A = -20℃ to +85℃	V_{IO}	--	--	+9.0	mVdc
Input Bias Current (Note 3 4) (Output in Linear Range) T_A = -20 ℃ to +85 ℃	I_{IB}	--	--	400	nA
Input Offset Current (Note 3) T_A = -20 ℃ to +85 ℃	I_{IO}	--	--	± 150	nA
Input Common-Mode Voltage Range T_A = -20 ℃ to +85 ℃	V_{ICR}	0	--	V_{CC}-2.0	V
Saturation Voltage $V_I(-) \geq +1.0$ Vdc, $V_I(+) = 0$, $I_{sink} \leq 4.0$mA T_A = -20 ℃ to +85 ℃	V_{sat}	--	--	700	mV
Output Lezkage Current $V_I(+) \geq +1.0$ Vdc, $V_I(-) = 0$, V_O = 30 Vdc T_A = -20℃ to +85 ℃	I_{OL}	--	--	1.0	μA
Differential Input Voltage ALL$V_I \geq 0$ Vdc (Note 6) T_A =-20 ℃ to +85 ℃	V_{ID}	--	--	V_{CC}	Vdc

Note :1. The maximum output current may be as high as 20mA, independent of the magnitude of V_{CC} Output short circuits to V_{CC} can cause excessive heating and eventual destruction.

2. This magnitude of input current will only occur if the leads are driven more negative than ground or the negative supply voltage. This is due to the input PNP collector base junction becoming forward biased, acting as an input clamp diode. There is also a lateral PNP parasitic transistor action which can cause the output voltage of the comparators to go to the V_{CC} voltage level (or ground if overdrive is large)during the time that an input is driven negative. This will not destroy the device when limited to the max rating and normal output states will recover when the inputs become ≥ground or negative supply.
3. At the output switch point, V_O = 1.4 Vdc, $R_S \leq 100\Omega$, 5.0 Vdc≤ V_{CC} ≤30 Vdc, with the inputs over the full common-mode range (o Vdc to V_{CC} -1.5 Vdc).
4. The bias current flows out of the inputs due to the PNP input stage. This current is virtually constant, independent of the output state.
5. The response time specified is for a 100 mV input step with 5.0 mV overdrive For larger signals, 300 ns is typical.
6. Positive excursions of input voltage may exceed the power supply level. As long as one of the inputs remain within the common-mode range, the comparator will provide the proper output state.

FIGURE 1- CIRCUIT SCHEMATIC
(Diagram shown is for 1 comparator)

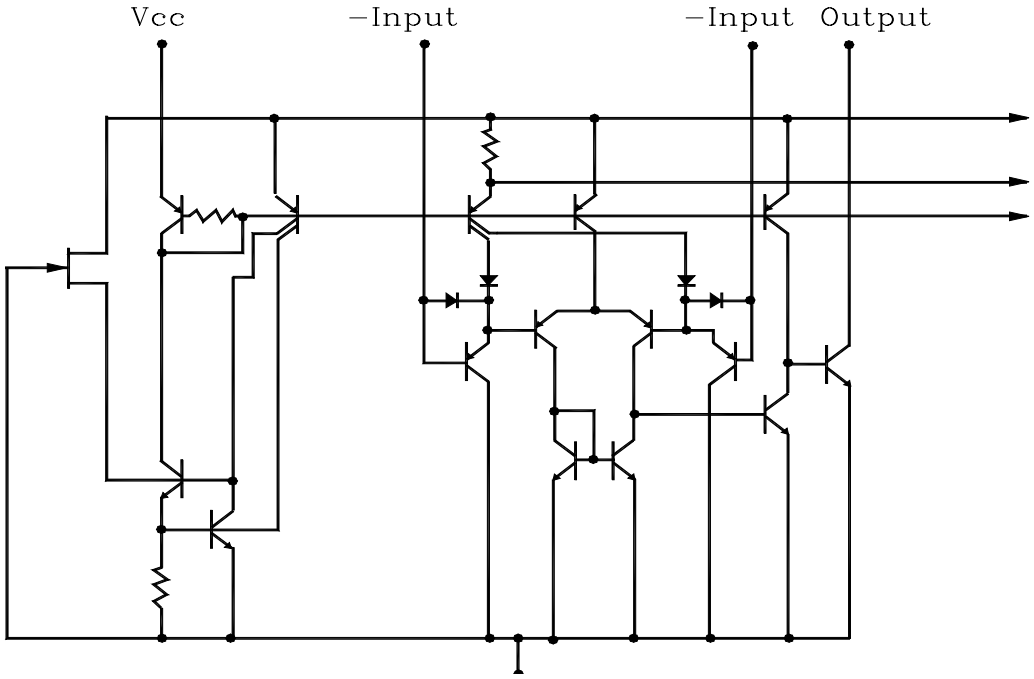


FIGURE 2 - INVERTING COMPARATOR WITH HYSTERESIS

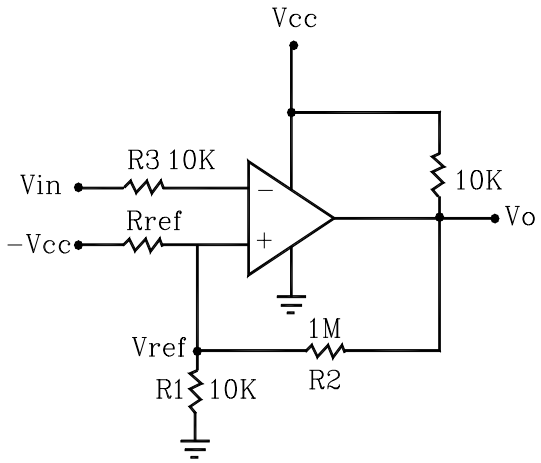


FIGURE 3 - NON-INVERTING COMPARATOR WITH HYSTERESIS

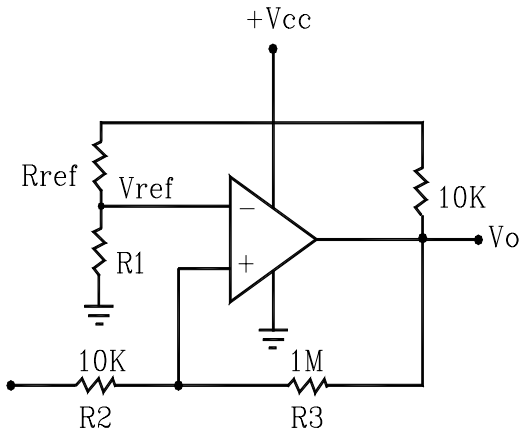


FIGURE 4 - NORMALIZED INPUT OFFSET VOLTAGE

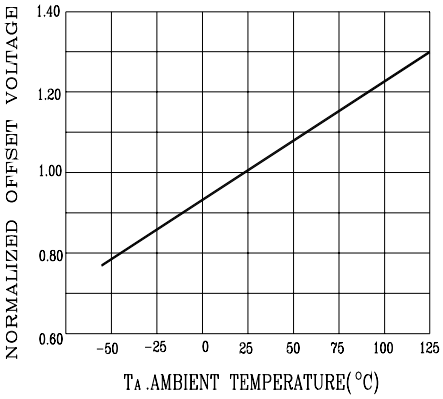


FIGURE 5 - INPUT BIAS CURRENT

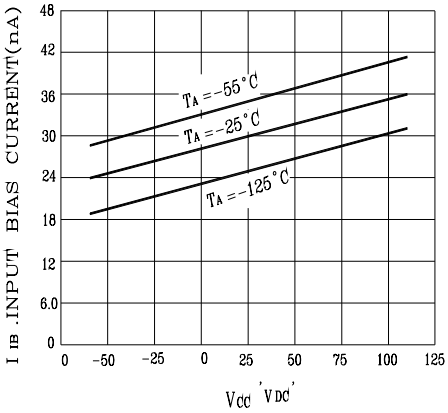


FIGURE 6 - OUTPUT SINK CURRENT versus OUTPUT SATURATION VOLTAGE

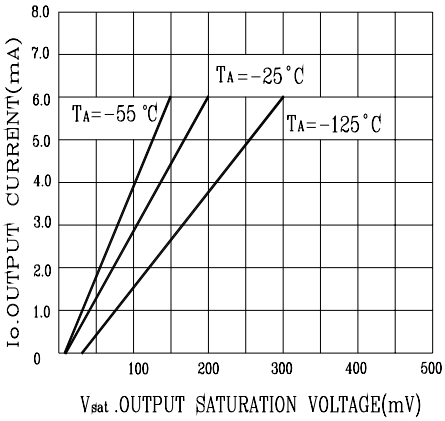


FIGURE 7- FRIVING LOGIC

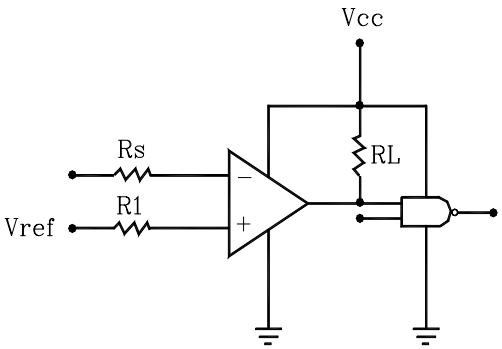
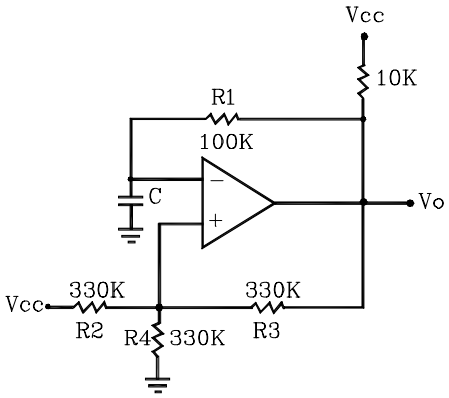


FIGURE 8 - SQUAREWAVE OSCILLATOR



APPLICATIONS INFORMATION

This quad comparator feature high gain, wide bandwidth characteristics. This gives the device oscillation tendencies if the outputs are capacitively coupled to the inputs via stray capacitance. This oscillation manifests itself during output transitions (V_{OL} to V_{OH}). To alleviate this situation input resistors ∠ 10 KΩ should be used. The addition of positive feedback (∠ 10 mV) is also recommended.

It is good design practice to ground all unused input pins.

Differential input voltages may be larger than supply voltage without damaging the comparator inputs.

Voltages more negative than -300mV should not be used.

FIGURE 9 - ZERO CROSSING DETECTOR
(Single Supply)

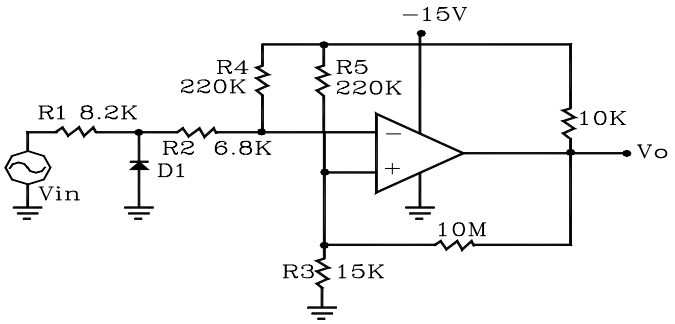
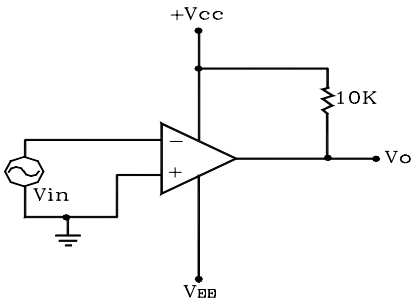
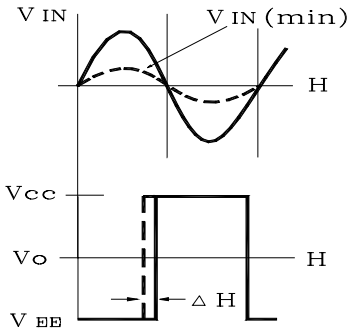


FIGURE 10 - ZERO CROSSING DETECTOR
(Split Supplies)

VINmin=0.4V peak for 1.phase dissfortion(Δ (-))



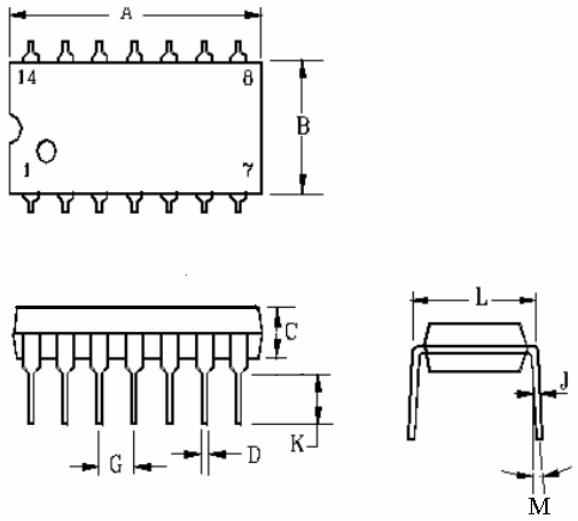


D1 prevents input from going negative by more than 06V

$$R1 * R2 * R3$$

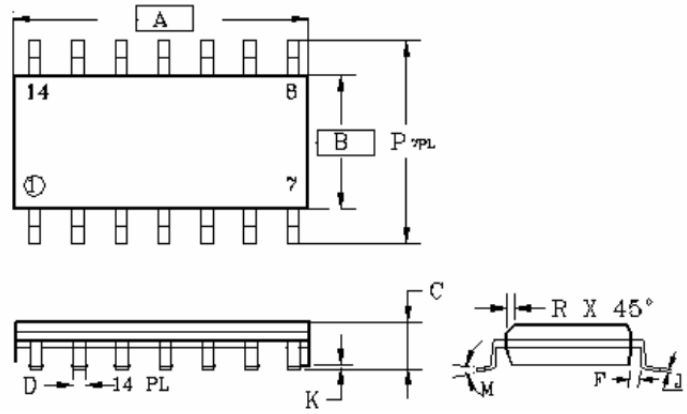
$R3\frac{R5}{10}$ for small error in zero crossing

DIP-14



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.55	19.56	0.73	0.77
B	6.22	6.48	0.245	0.255
C	3.18	4.43	0.125	0.135
D	0.35	0.55	0.019	0.020
G	2.54BSC		0.10BSC	
J	0.29	0.31	0.011	0.012
K	3.25	3.35	0.128	0.132
L	7.75	8.00	0.305	0.315
M	-	10°	-	10°

SOP-14



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27BSC		0.05BSC	
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019