

BIPOLAR ANALOG INTEGRATED CIRCUIT μPC339

LOW POWER QUAD COMPARATOR

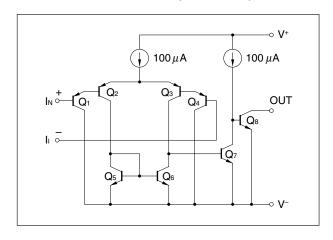
DESCRIPTION

The μ PC339 is a quad comparator which is designed to operate from a single power supply over a wide range of voltage. Operation from split power supplies, is also possible and the power supply current drain is very low. Further advantage, the input common-mode voltage includes ground, even though operated from a single power supply voltage.

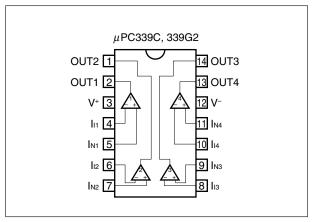
FEATURES

- Common-mode input voltage range includes V-
- Wide supply voltage range 2 V to 32 V (Single) ± 1 V to ± 16 V (Split)
- · Low supply current
- Open collector output

EQUIVALENT CIRCUIT (1/4 Circuit)



PIN CONFIGURATION (Top View)



ORDERING INFORAMTION

Part Number	Package
μPC339C	14-pin plastic DIP (7.62 mm (300))
μ PC339G2	14-pin plastic SOP (5.72 mm (225))
μ PC339G2(5)	14-pin plastic SOP (5.72 mm (225))

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ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C)

Parameter		Symbol	Ratings	Unit	
Voltage between V ⁺ and V ⁻		Note 1	V+ -V-	−0.3 to +36	V
Differential Input Voltage			VID	±36	V
Input Voltage		Note 2	Vı	V ⁻ -0.3 to V ⁻ +36	V
Output Voltage		Note 3	Vo	V⁻−0.3 to V⁻ +36	V
Power Dissipation	C Package	Note 4	Рт	570	mW
	G2 Package	Note 5		550	mW
Output Short Circuit Duration	on	Note 6		Indefinite	sec
Operating Ambient Temperature		TA	-20 to +80	°C	
Storage Temperature			T _{stg}	-55 to + 125	°C

Notes 1. Reverse connection of supply voltage can cause destruction.

- 2. The input voltage should be allowed to input without damage or destruction independent of the magnitude of V⁺. Either input signal should not be allowed to go negative by more than 0.3 V. The normal operation will establish when any input is within the Common Mode Input Voltage Range of electrical characteristics.
- **3.** This specification is the voltage which should be allowed to supply to the output terminal from external without damage or destruction independent of the magnitude of V⁺. Even during the transition period of supply voltage, power on/off etc., this specification should be kept.
- 4. Thermal derating factor is -7.6 mW/°C when operating ambient temperature is higher than 55 °C.
- 5. Thermal derating factor is -5.5 mW/°C when operating ambient temperature is higher than 25 °C.
- **6.** Short circuits from the output to V⁺ can cause destruction. Pay careful attention to the total power dissipation not to exceed the absolute maximum ratings, Note 4 and Note 5.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage (Split)	V^\pm	±1		±16	V
Supply Voltage (V- = GND)	V+	+2		+32	V



μ PC339C, μ PC339G2 ELECTRICAL CHARACTERISTICS (Ta = 25°C, V+ = 5 V, V⁻ = GND)

Parameter Symbol Conditions MIN. TYP. MAX. Unit Input Offset Voltage Vo = 1.4 V, VREF = 1.4 V, Rs = 0 Ω V_{10} ±2 ±5 mV Input Offset Current Vo **≐** 1.4 V ±5 ±50 lιο nΑ Input Bias CurrentNote 7 Vo ≒ 1.4 V 25 250 nΑ lв Voltage Gain $R_L = 15 \text{ k}\Omega$ V/mV A_{V} 200 Supply CurrentNote 8 Icc $R_L = \infty$, $I_0 = 0$ A 8.0 2 $\mathsf{m}\mathsf{A}$ Common Mode Input Voltage Range Vісм 0 V+-1.5 ٧ Output Saturation Voltage Vol $V_{IN(-)} = 1 V$, $V_{IN(+)} = 0 V$, $I_{OSINK} = 4 mA$ 0.2 0.4 Output Sink Current lo sink $V_{\text{IN }(-)} = 1 \ V, \ V_{\text{IN }(+)} = 0 \ V, \ V_{\text{O}} \leq 1.5 \ V$ 6 16 $\mathsf{m}\mathsf{A}$ Output Leakage Current IO LEAK $V_{IN (+)} = 1 V$, $V_{IN (-)} = 0 V$, $V_0 = 5 V$ 0.1 nΑ Response Time $R_L = 5.1 \text{ k}\Omega, V_{RL} = 5 \text{ V}$ 1.3 μs

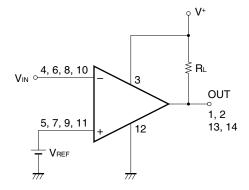
* μ PC339G2(5) ELECTRICAL CHARACTERISTICS (T_A = 25°C, V⁺ = 5 V, V⁻ = GND)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	Vio	Vo = 1.4 V, VREF = 1.4 V, Rs = 0 Ω		±2	±2.5	mV
Input Offset Current	lio	Vo ≒ 1.4 V		±5	±50	nA
Input Bias CurrentNote 7	Ів	Vo ≒ 1.4 V		25	60	nA
Voltage Gain	Av	R _L = 15 kΩ		200		V/mV
Supply CurrentNote 8	lcc	R _L = ∞, Io = 0 A		0.8	2	mA
Common Mode Input Voltage Range	VICM		0		V+-1.4	V
Output Saturation Voltage	Vol	$V_{IN (-)} = 1 V, V_{IN (+)} = 0 V, Io sink = 4 mA$		0.2	0.2	V
Output Sink Current	lo sink	$V_{IN (-)} = 1 V, V_{IN (+)} = 0 V, V_0 \le 1.5 V$	10	16		mA
Output Leakage Current	lo leak	V _{IN} (+) = 1 V, V _{IN} (-) = 0 V, V _O = 5 V		0.1	100	nA
Response Time		$R_L = 5.1 \text{ k}\Omega, V_{RL} = 5 \text{ V}$		1.3		μs

- ★ Notes 7. Input bias currents flow out from IC. Because each currents are base current of PNP-transistor on input stage.
 - 8. This current flows irrespective of the existence of use.

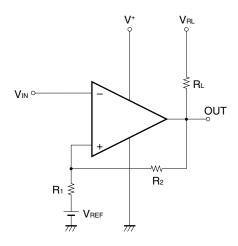


APPLICATION CIRCUIT EXAMPLE



 V_{REF} : V^- to V^+ –1.5 (V)

COMPARATOR with HYSTERESIS CIRCUIT



• Threshold voltage

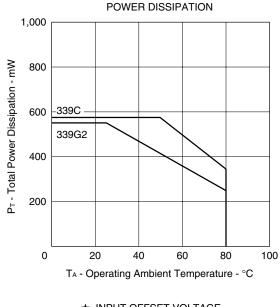
$$V_{\text{TH (High)}} \buildrel \neq V_{\text{REF}} + \ \frac{R_1}{R_L + R_2 + R_1} \ \left(V_{\text{RL}} - V_{\text{REF}}\right)$$

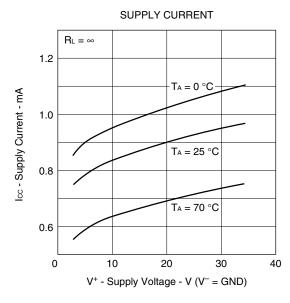
$$V_{\text{TH (Low)}} \buildrel \neq V_{\text{REF}} - \frac{R_1}{R_1 + R_2} \ \left(V_{\text{REF}} - V_{\text{OL}} \right)$$

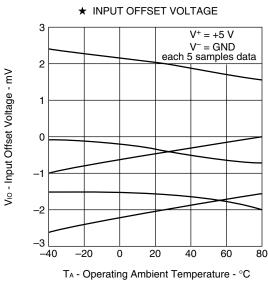
 $(V_{RL} > V_{REF} > V_{OL})$

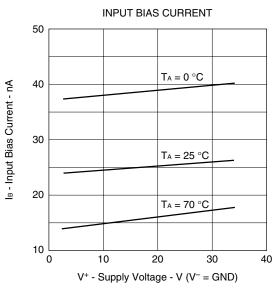


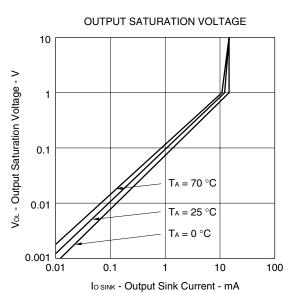
TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25 °C, TYP.)



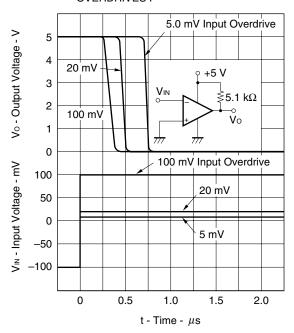




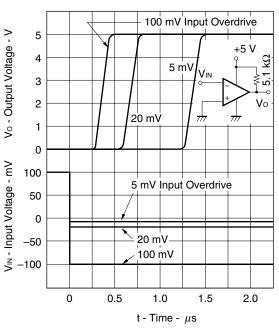




★ RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES I

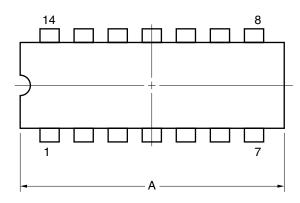


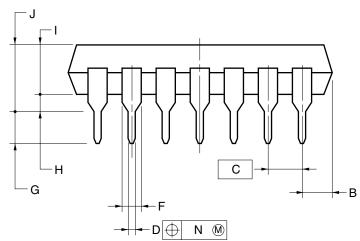
★ RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES II

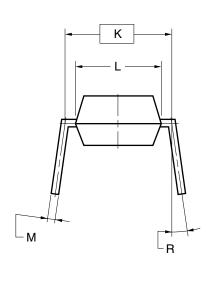


★ PACKAGE DRAWINGS (Unit: mm)

14-PIN PLASTIC DIP (7.62 mm (300))







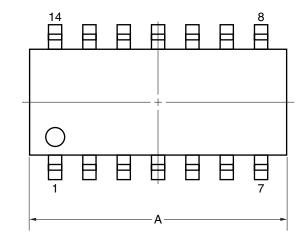
NOTES

- 1. Each lead centerline is located within 0.25 mm of its true position (T.P.) at maximum material condition.
- 2. Item "K" to center of leads when formed parallel.

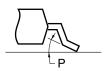
ITEM	MILLIMETERS
Α	19.22±0.2
В	2.14 MAX.
С	2.54 (T.P.)
D	0.50±0.10
F	1.32±0.12
G	3.6±0.3
Н	0.51 MIN.
I	3.55
J	4.3±0.2
K	7.62 (T.P.)
L	6.4±0.2
М	$0.25^{+0.10}_{-0.05}$
N	0.25
R	0~15°
	140 400 00004

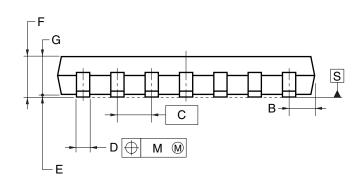
P14C-100-300B1-3

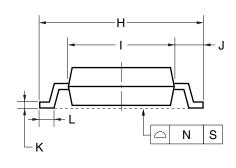
14-PIN PLASTIC SOP (5.72 mm (225))



detail of lead end







NOTE

Each lead centerline is located within 0.1 mm of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS
Α	10.2±0.26
В	1.42 MAX.
С	1.27 (T.P.)
D	$0.42^{+0.08}_{-0.07}$
Е	0.1±0.1
F	$1.59^{+0.21}_{-0.2}$
G	1.49
Н	6.5±0.2
ı	4.4±0.1
J	1.1±0.16
K	$0.17^{+0.08}_{-0.07}$
L	0.6±0.2
М	0.1
N	0.10
Р	3°+7°

S14GM-50-225B, C-6



★ RECOMMENDED SOLDERING CONDITIONS

The μ PC339 should be soldered and mounted under the following recommended conditions.

For soldering methods and conditions other than those recommended below, contact an NEC Electronics sales representative.

For technical information, see the following website.

Semiconductor Device Mount Manual (http://www.necel.com/pkg/en/mount/index.html)

Surface mount device

μ PC339G2, μ PC339G2(5): 14-pin plastic SOP (5.72 mm (225))

Process	Conditions	Symbol
Infrared ray reflow	Peak temperature: 230 °C or below (Package surface temperature), Reflow time: 30 seconds or less (at 210 °C or higher), Maximum number of reflow processes: 1 time.	IR30-00-1
Vapor Phase Soldering	Peak temperature: 215 °C or below (Package surface temperature), Reflow time: 40 seconds or less (at 200 °C or higher), Maximum number of reflow processes: 1 time.	VP15-00-1
Wave Soldering	Solder temperature: 260 °C or below, Flow time: 10 seconds or less, Maximum number of flow processes: 1 time, Pre-heating temperature: 120 °C or below (Package surface temperature).	WS60-00-1
Partial heating method	Pin temperature: 300 °C or below, Heat time: 3 seconds or less (Per each side of the device).	-

Caution Apply only one kind of soldering condition to a device, except for "partial heating method", or the device will be damaged by heat stress.

Through-hold device

μ PC339C: 14-pin plastic DIP (762 mm (300))

Process	Conditions	
Wave soldering (only to leads)	Solder temperature: 260 °C or below, Flow time: 10 seconds or less.	
Partial heating method	Pin temperature: 300 °C or below, Heat time: 3 seconds or less (per each lead.)	

Caution For through-hole device, the wave soldering process must be applied only to leads, and make sure that the package body does not get jet soldered.



REFERENCE DOCUMENTS

QUALITY GRADES ON NEC SEMICONDUCTOR DEVICES

SEMICONDUCTOR DEVICE MOUNT MANUAL

NEC SEMICONDUCTOR DEVICE RELIABILITY/

QUALITY CONTROL SYSTEM - STANDARD LINEAR IC

C11531E http://www.necel.com/pkg/en/mount/index.html IEI-1212

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