



虹冠電子工業股份有限公司  
Champion Microelectronic Corporation

*Specialized in Integrated High Efficient Switching Power Management Solutions*  
高整合高效率交換型電源管理方案之專業 I C 設計



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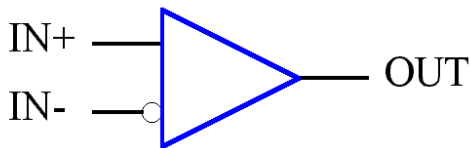
## GENERAL DESCRIPTION

This device consists of four independent precision voltage comparators with an offset voltage specification as low as 2mV max for CM339. All these comparators were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible. These Comparators also have a unique characteristic in that the input common mode voltage range includes ground even though operated from a single power supply voltage.

## FEATURES

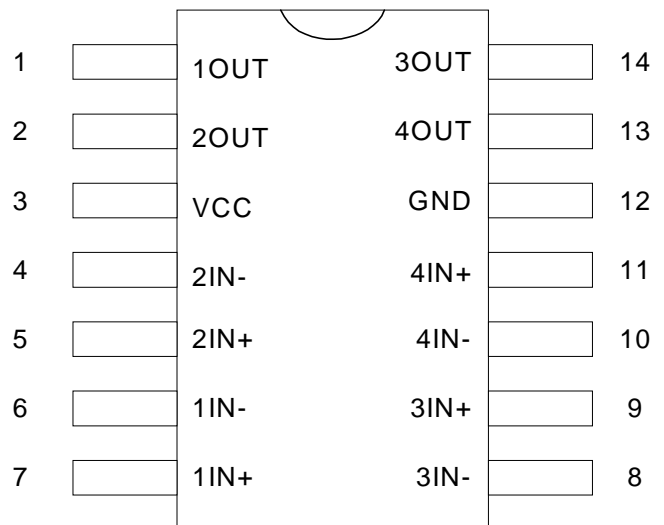
- ◆ Wide single supply voltage range or dual supplies for all devices: +2V to +36V or  $\pm 1V$  to  $\pm 18V$
- ◆ Very low supply current ( 1.1mA ) independent of supply voltage ( 1.4mW/comparator +5V )
- ◆ Low input bias current: 25nA typ
- ◆ Low input offset current:  $\pm 5nA$  typ
- ◆ Low input offset voltage:  $\pm 1mV$  typ
- ◆ Input common-mode voltage range includes ground
- ◆ Low output saturation voltage : 250mV typ, (  $I_o = 4mA$  )
- ◆ Differential input voltage range equal to the supply voltage
- ◆ TTL, DTL, ECL, MOS, CMOS compatible output

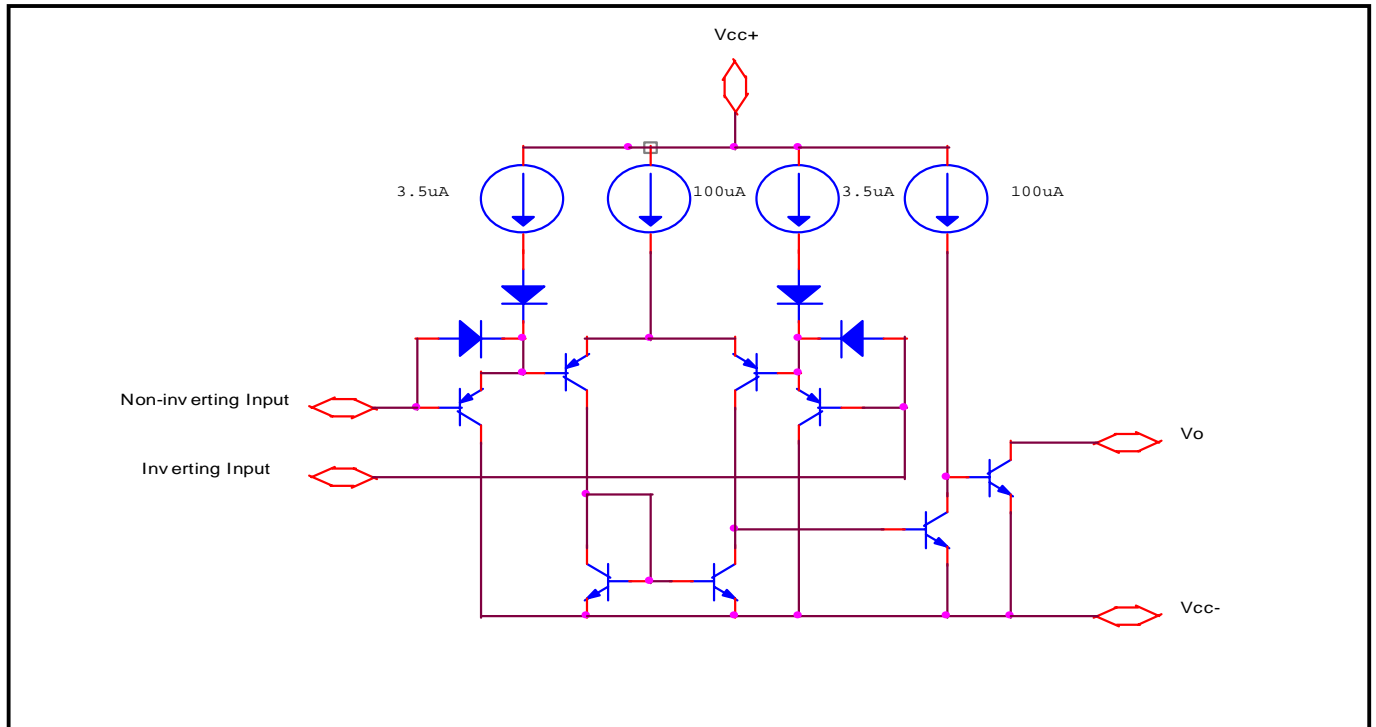
## SYMBOL



## PIN CONFIGURATION

14 Pin PDIP/SOP  
(Top View)



**BLOCK DIAGRAM**

**ORDERING INFORMATION**

Part Number	Temperature Range	Package
CM339CP	0°C to 70°C	14-Pin PDIP(P14)
CM339CS	0°C to 70°C	14-Pin SOP(S14)

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	CM339	Unit
V <sub>cc</sub>	Supply voltage	±18 to 36	V
V <sub>id</sub>	Differential input voltage	±36	V
V <sub>I</sub>	Input voltage	-0.3 to + 36	V
P <sub>tot</sub>	Power dissipation	570	mW
T <sub>oper</sub>	Operating free-air temperature range	0, +70	°C
T <sub>stg</sub>	Storage temperature range	-65, +150	°C

**ELECTRICAL CHARACTERISTICS**
 $V_{cc}^+ = +5V$ ,  $V_{cc}^+ = GND$ ,  $T_{amb}=25^{\circ}C$  ( Unless otherwise specified )

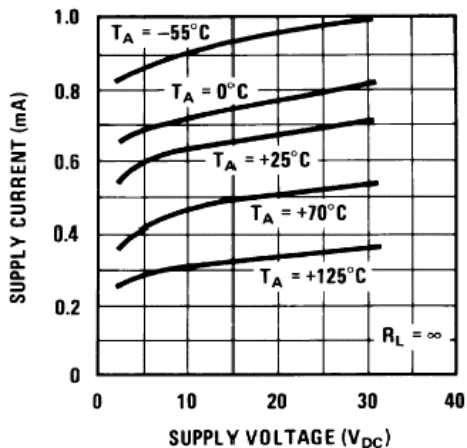
Symbol	Parameter	CM339			Units
		Min.	Typ.	Max.	
$V_{io}$	Input offset voltage- ( note 1 ) $T_{amb} = +25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$		1.0	2.2	MV
$I_{io}$	Input offset current $T_{amb} = +25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$		5.0	50	nA
$I_{io}$	Input bias current $T_{amb} = +25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$		25	250	nA
$A_{vd}$	Large signal voltage gain ( $V_{cc} = 15$ , $R_L = 15k\Omega$ , $V_o = 1$ to $11V$ )	50	200		V/mV
$I_{cc}$	Supply current ( all comparators ) $V_{cc} = +5V$ , no load $V_{cc} = +30V$ , no load		0.8	2.0	mA
$V_{icm}$	Input common mode voltage range- ( note 2 ) ( $V_{cc} = 30V$ ) $T_{amb} = +25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$	0		$V_{cc}^+ - 1.5$	V
$V_{id}$	Differential input voltage - ( note 4 )			36	V
$I_{sink}$	Output sink current ( $V_{id} = -1V$ , $V_o = 1.5V$ )	6.0	16		mA
$t_{re}$	Response Time - ( note 3 ) ( $R_L = 5.1k\Omega$ connected to $V_{cc}^+$ )		1.3		$\mu s$
$t_{rel}$	Large signal response time ( $R_L = 5.1k\Omega$ connected to $V_{cc}^+$ , $e_i = TTL$ , $V_{(ref)} = +1.4V$ )		300		ns

**Notes :** 1. At output switch point,  $V_o = 1.4V$ ,  $R_s = 0$  with  $V_{cc}^+$  from 5V to 30V, and over the full input common-mode range ( 0V to  $V_{cc}^+ - 1.5V$  ) .

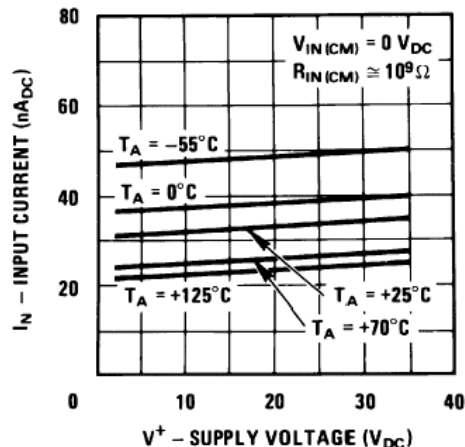
- The input common-mode voltage of the either input signal voltage should not be allowed to go negative by more than 0.3V. The upper and of the common-mode voltage range is  $V_{cc}^+ - 1.5V$ , but either or both inputs can go to +30V without damage.
- The response time specified is for a 100mV input step with 5mV overdrive. For larger overdrive signals 300ns can be obtained.
- Positive excursions of input voltage may power supply level. As long as the other voltage remains within the common-mode range, the comparator will provide a proper output state. The low input voltage state must not be less than  $-0.3V$  ( or 0.3V bellow the negative power supply, if used ) .

**TYPICAL CHARACTERISTICS**

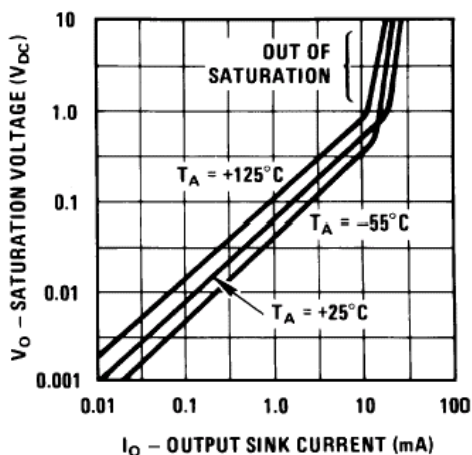
Supply Current



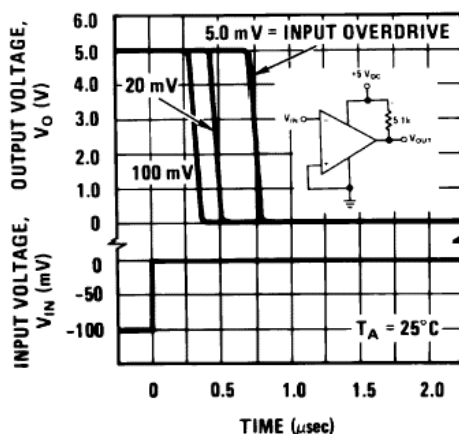
Input Current



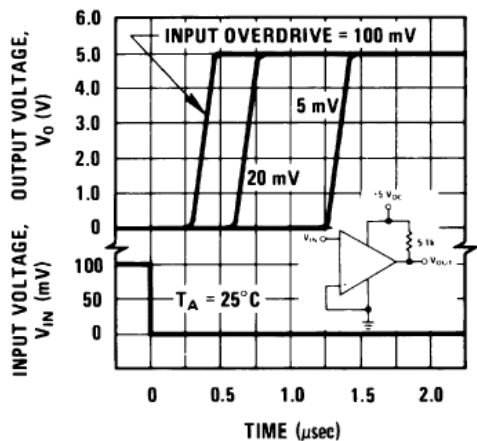
Output Saturation Voltage

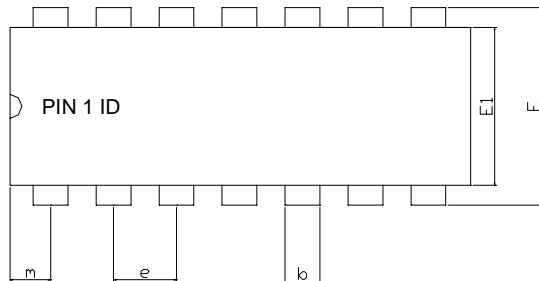


Response Time for Various Input Overdrives - Negative Transistors

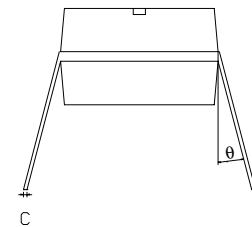
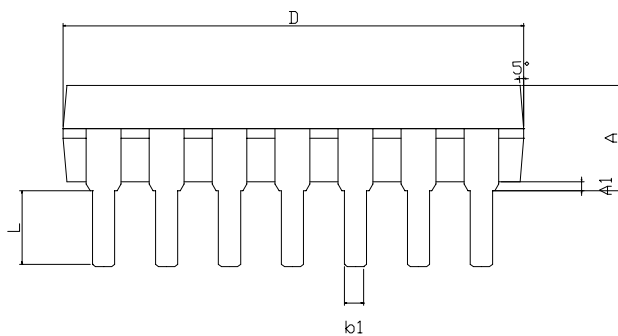
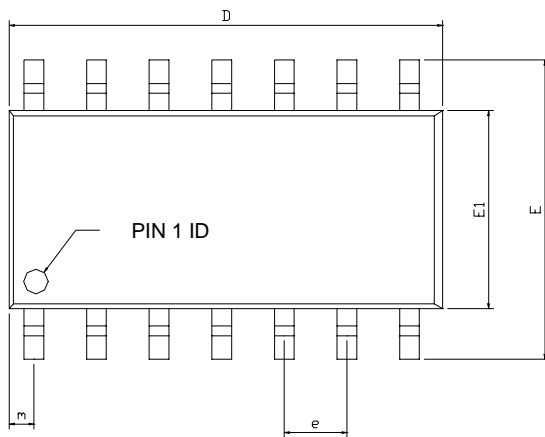


Response Time for Various Input Overdrives - Positive Transistors

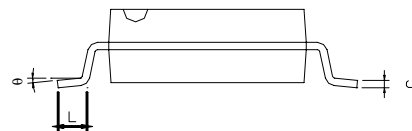
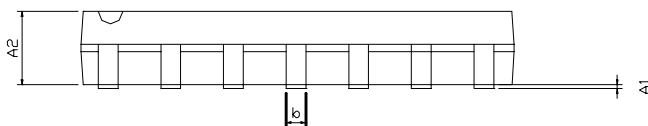


**PACKAGE DIMENSION**
**14-PIN PDIP (P14)**


SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	4.32	---	---	0.170
A1	0.38	---	---	0.015	---	---
b	1.40	---	1.65	0.055	---	0.065
b1	0.40	---	0.56	0.016	---	0.022
C	0.20	---	0.31	0.008	---	0.012
D	18.79	---	19.31	0.740	---	0.760
E	7.49	---	8.26	0.295	---	0.325
E1	6.09	---	6.61	0.240	---	0.260
e	---	2.54	---	---	0.100	---
L	3.18	---	---	0.125	---	---
m	1.77	---	---	0.070	---	---
$\theta$	0°	---	15°	0°	---	15°


**14-PIN SOP (S14)**


SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHS		
	MIN	NOM	MAX	MIN	NOM	MAX
A1	0.10	---	0.25	0.004	---	0.010
A2	1.40	---	1.55	0.055	---	0.061
b	0.30	---	0.51	0.012	---	0.020
C	0.15	---	0.26	0.006	---	0.010
D	8.56	---	8.81	0.337	---	0.347
E	5.79	---	6.20	0.228	---	0.244
E1	3.76	---	4.01	0.148	---	0.158
e	---	1.27	---	---	0.050	---
L	0.38	---	0.69	0.015	---	0.035
m	0.43	---	0.69	0.017	---	0.027
$\theta$	0°	---	8°	0°	---	8°



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