

LM339/LM339A, LM239A, LM2901

Quad Comparator

Features

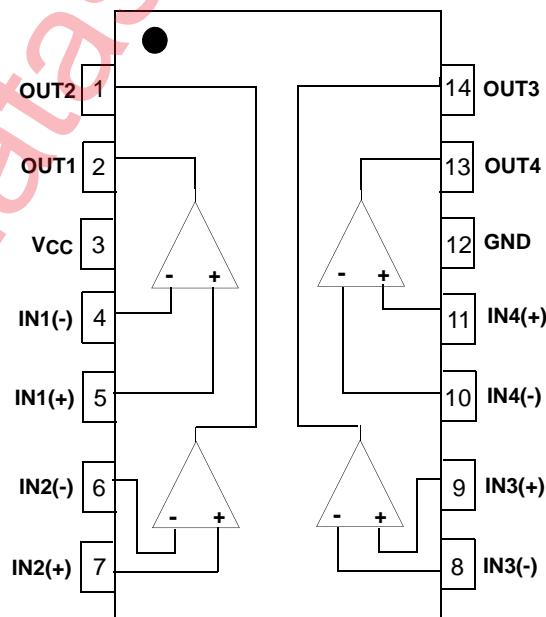
- Single or Dual Supply Operation
- Wide Range of Supply Voltage
LM2901, LM339/LM339A, LM239A: 2 ~ 36V (or $\pm 1 \sim \pm 18V$)
- Low Supply Current Drain 800 μ A Typ.
- Open Collector Outputs for Wired and Connectors
- Low Input Bias Current 25nA Typ.
- Low Input Offset Current $\pm 2.3nA$ Typ.
- Low Input Offset Voltage $\pm 1.4mV$ Typ.
- Input Common Mode Voltage Range Includes Ground.
- Low Output Saturation Voltage
- Output Compatible With TTL, DTL and MOS Logic System

Description

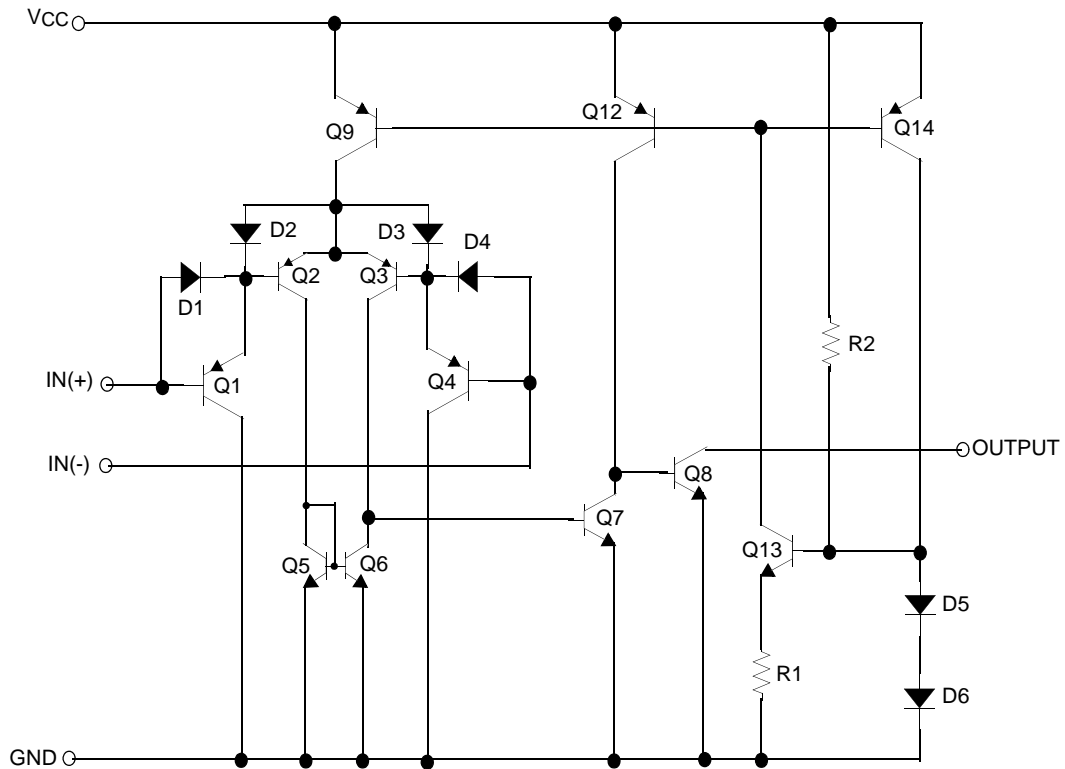
The LM339/LM339A, LM239A, LM2901 consist of four independent voltage comparators designed to operate from single power supply over a wide voltage range.



Internal Block Diagram



Schematic Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V _{CC}	±18 or 36	V
Differential Input Voltage	V _{I(DIFF)}	36	V
Input Voltage	V _I	-0.3 to +36	V
Output Short Circuit to GND	-	Continuous	-
Power Dissipation	P _D	570	mW
Operating Temperature			
LM339/LM339A	T _{OPR}	0 ~ +70	°C
LM2901		-40 ~ +85	
LM239A		-25 ~ +85	
Storage Temperature	T _{STG}	-65 ~ +150	°C

Electrical Characteristics

($V_{CC} = 5V$, $T_A = 25^\circ C$, unless otherwise specified)

Parameter	Symbol	Conditions	LM239A/LM339A			LM339			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	$V_{O(P)} = 1.4V$, $R_S = 0\Omega$	-	1	2	-	1.4	5	mV
		Note1	-	-	4.0	-	-	9.0	
Input Offset Current	I_{IO}	$I_{IN(+)} - I_{IN(-)}$, $V_{CM} = 0V$	-	2.3	50	-	2.3	50	nA
		Note1	-	-	150	-	-	150	
Input Bias Current	I_{BIAS}	$V_{CM} = 0V$	-	57	250	-	57	250	nA
		Note1	-	-	400	-	-	400	
Input Common Mode Voltage Range	$V_{I(R)}$	$V_{CC} = 30V$	0	-	$V_{CC}-1.5$	0	-	$V_{CC}-1.5$	V
		Note1	0	-	$V_{CC}-2$	0	-	$V_{CC}-2$	
Supply Current	I_{CC}	$V_{CC} = 5V$, $R_L = \infty$	-	1.1	2.0	-	1.1	2.0	mA
Voltage Gain	G_V	$V_{CC} = 15V$, $R_L \geq 15k\Omega$ (for large swing)	50	200	-	50	200	-	V/mV
Large Signal Response Time	T_{LRES}	$V_I = \text{TTL Logic Swing}$ $V_{REF} = 1.4V$, $V_{RL} = 5V$, $R_L = 5.1k\Omega$ (Note2)	-	300	-	-	300	-	ns
Response Time	T_{RES}	$V_{RL} = 5V$, $R_L = 5.1k\Omega$ (Note2)	-	1.3	-	-	1.3	-	μs
Output Sink Current	I_{SINK}	$V_{I(-)} \geq 1V$, $V_{I(+)} = 0V$, $V_{O(P)} \leq 1.5V$	6	18	-	6	18	-	mA
Output Saturation Voltage	V_{SAT}	$V_{I(-)} \geq 1V$, $V_{I(+)} = 0V$	-	140	400	-	140	400	mV
		$I_{SINK} = 4mA$ Note1	-	-	700	-	-	700	
Output Leakage Current	$I_{o(LKG)}$	$V_{I(-)} = 0V$	$V_{O(P)} = 5V$	-	0.1	-	-	0.1	nA
		$V_{I(+)} = 1V$	$V_{O(P)} = 30V$	-	-	1.0	-	-	1.0
Differential Voltage	$V_{I(DIFF)}$	Note1	-	-	36	-	-	36	V

Note:

- LM339/LM339A : $0 \leq T_A \leq +70^\circ C$
LM2901 : $-40 \leq T_A \leq +85^\circ C$
LM239A : $-25 \leq T_A \leq +85^\circ C$
- These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (Continued)(V_{CC} = 5V, T_A = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions	LM2901			Unit	
			Min.	Typ.	Max.		
Input Offset Voltage	V _{IO}	VO(P) = 1.4V, R _S = 0Ω	-	2	7	mV	
		Note1	-	9	15		
Input Offset Current	I _{IO}		-	2.3	50	nA	
		Note1	-	50	200		
Input Bias Current	I _{BIAS}		-	57	250	nA	
		Note1	-	200	500		
Input Common Mode Voltage Range	V _{I(R)}	LM2901, V _{CC} = 30V	0	-	V _{CC} -1.5	V	
		Note1	0	-	V _{CC} -2		
Supply Current	I _{CC}	R _L = ∞, V _{CC} = 5V	-	1.1	2.0	mA	
		R _L = ∞, V _{CC} = 30V	-	1.6	2.5		
Voltage Gain	G _V	V _{CC} = 15V, R _L ≥ 15kΩ (for large swing)	25	100	-	V/mV	
Large Signal Response Time	T _{LRES}	V _I = TTL Logic Swing V _{REF} = 1.4V, V _{RL} = 5V, R _L = 5.1kΩ (Note2)	-	300	-	ns	
Response Time	T _{RES}	V _{RL} = 5V, R _L = 5.1kΩ (Note2)	-	1.3	-	μs	
Output Sink Current	I _{SINK}	V _{I(-)} ≥ 1V, V _{I(+)} = 0V, V _{O(P)} ≤ 1.5V	6	18	-	mA	
Output Saturation Voltage	V _{SAT}	V _{I(-)} ≥ 1V, V _{I(+)} = 0V	-	140	400	mV	
		I _{SINK} = 4mA	Note1	-	700		
Output Leakage Current	I _{O(LKG)}	V _{I(-)} = 0V	VO(P) = 5V	-	0.1	-	nA
		V _{I(+)} = 1V	VO(P) = 30V	-	-	1.0	μA
Differential Voltage	V _{I(DIFF)}	Note1	-	-	36	V	

Note:

- LM339/LM339A : 0 ≤ T_A ≤ +70°C
LM2901 : -40 ≤ T_A ≤ +85°C
LM239A : -25 ≤ T_A ≤ +85°C
- These parameters, although guaranteed, are not 100% tested in production.

Typical Performance Characteristics

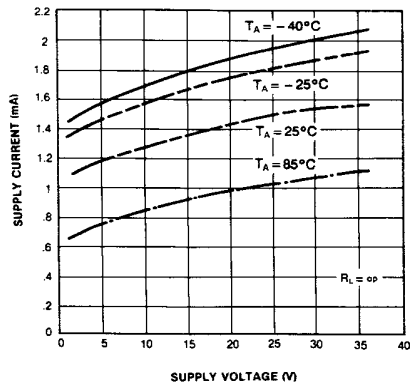


Figure 1. Supply Current vs Supply Voltage

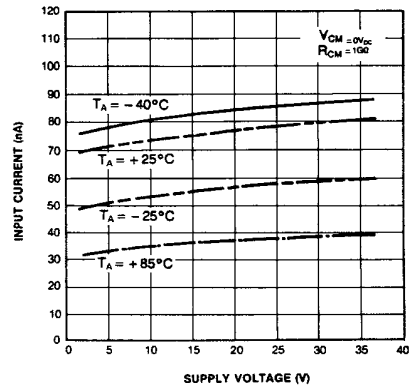


Figure 2. Input Current vs Supply Voltage

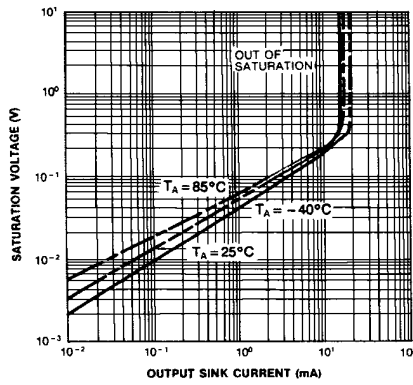


Figure 3. Output Saturation Voltage vs Sink Current

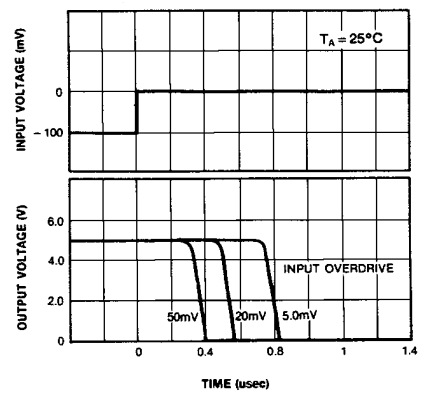


Figure 4. Response Time for Various Input Overdrive-Negative Transition

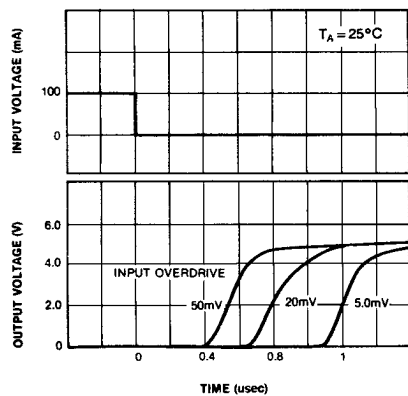


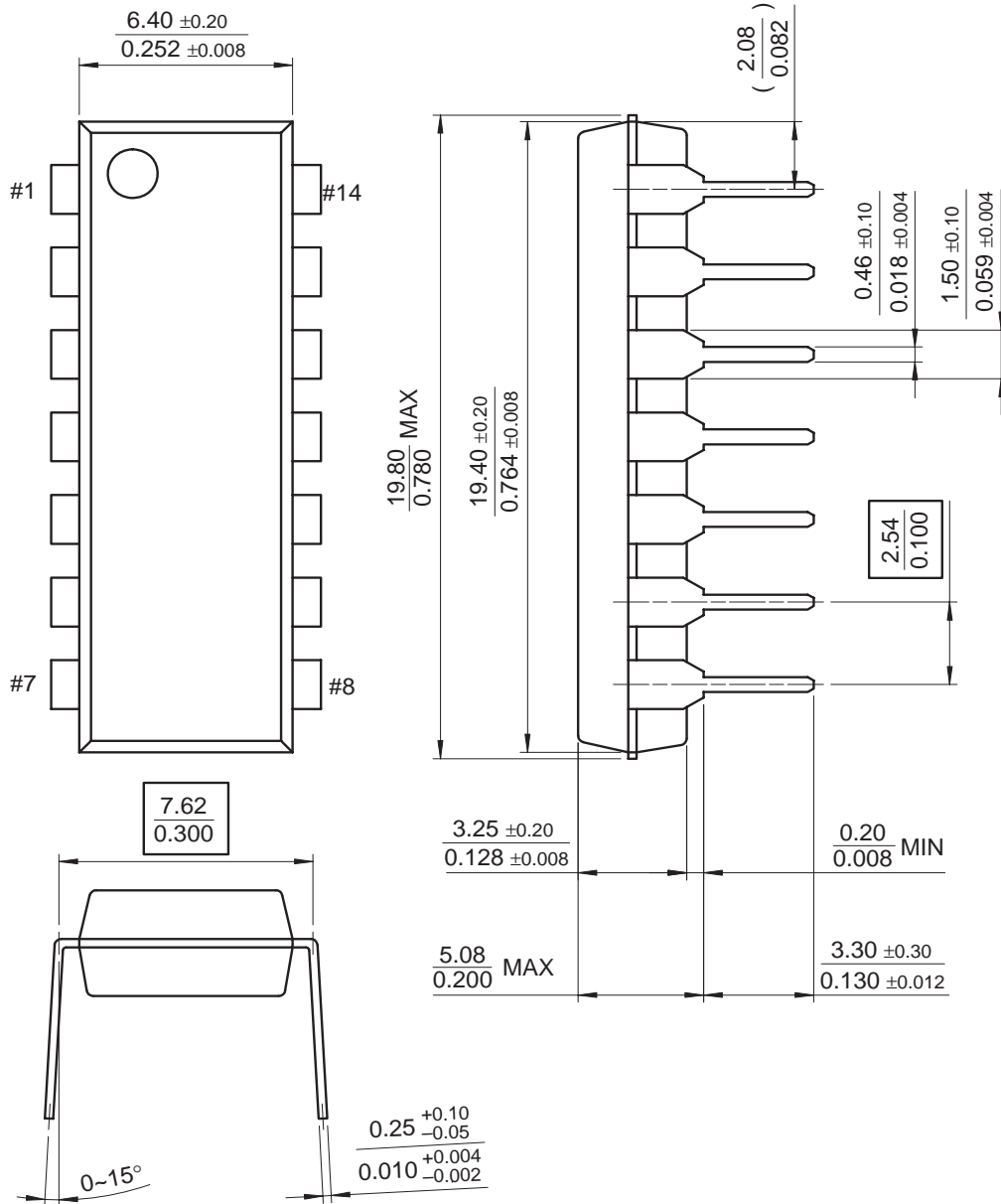
Figure 5. Response Time for Various Input Overdrive-Positive Transition

Mechanical Dimensions

Package

Dimensions in millimeters

14-DIP

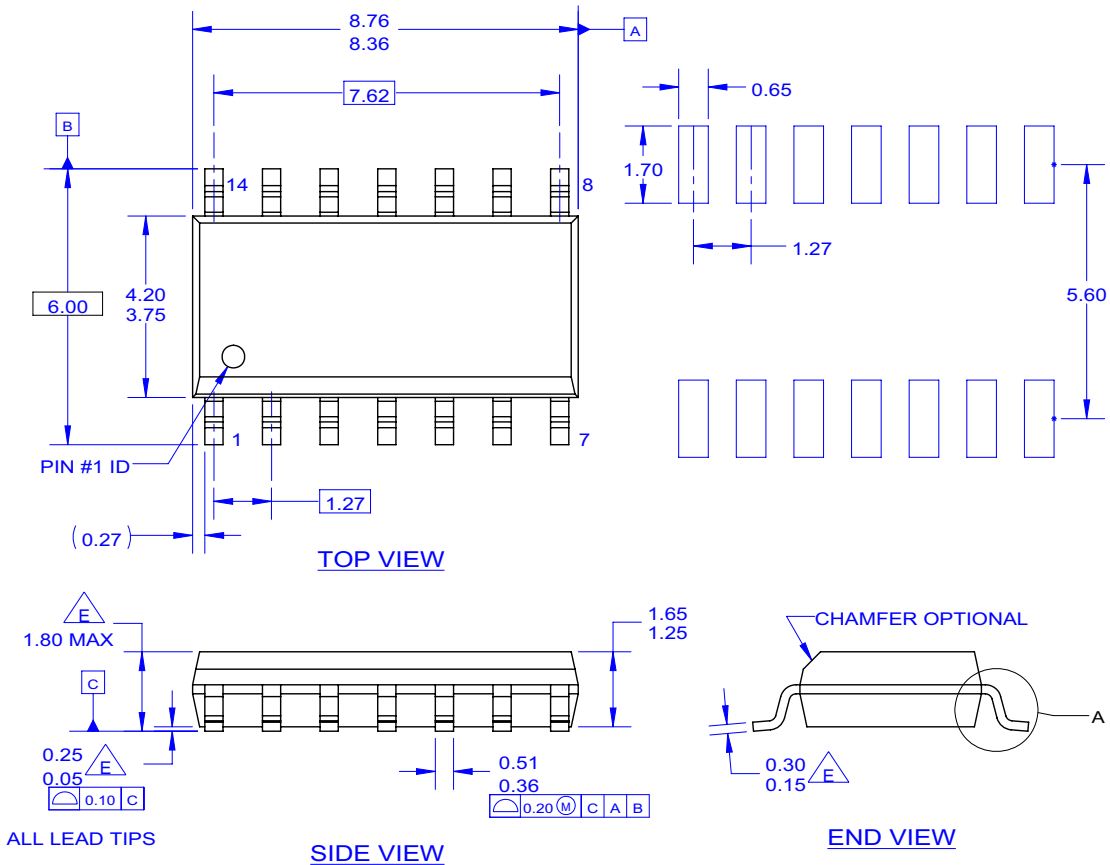


Mechanical Dimensions (Continued)

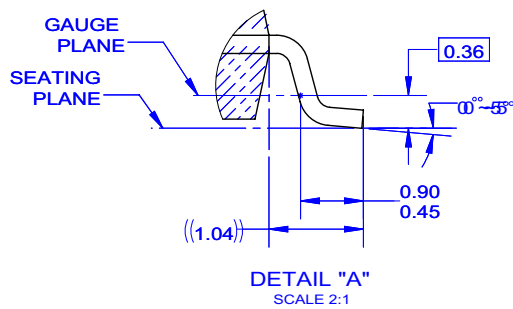
Package

Dimensions in millimeters

14-SOP



- NOTES: UNLESS OTHERWISE SPECIFIED
- A. THIS PACKAGE REFERENCE TO JEDEC MS-012 VARIATION AB.
 - B. ALL DIMENSIONS ARE IN MILLIMETERS.
 - C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
 - D. DIMENSIONS AND TOLERANCES AS PER ASME Y14.5-1994.
 - E. OUT OF JEDEC STANDARD VALUE.
 - F. LAND PATTERN STANDARD: SOIC127P600X145-14M.
 - G. FILE NAME: MKT-M14C REV2



Ordering Information

Product Number	Package	Operating Temperature
LM339N	14-DIP	0 ~ +70°C
LM339AN		
LM339M	14-SOP	
LM339AM		
LM2901N	14-DIP	-40 ~ +85°C
LM2901M	14-SOP	
LM239AN	14-DIP	-25 ~ +85°C
LM239AM	14-SOP	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.