



钜地半导体
Tudi Semiconductor

Product Specification

TUDI-LM339, LM339E, LM239, LM2901,
LM2901E, LM2901V, NCV2901, MC3302

Single Supply Quad Comparators

网址 www.sztdbdt.com Q

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**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Feature

- Single Supply Operation: 3.0 V to 36 V
- Split Supply Operation: ± 1.5 V to ± 18 V
- Low Input Bias Current: 25 nA (Typ)
- Low Input Offset Current: ± 5.0 nA (Typ)
- Low Input Offset Voltage
- Input Common Mode Voltage Range to GND
- Low Output Saturation Voltage: 130 mV (Typ) @ 4.0 mA
- TTL and CMOS Compatible
- ESD Clamps on the Inputs Increase Reliability without

Affecting Device Operation

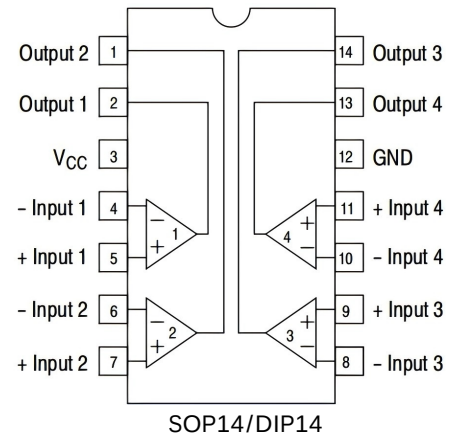
- NCV Prefix for Automotive and Other Applications

Requiring

Unique Site and Control Change Requirements; AEC-Q100

Qualified and PPAP Capable

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant





MAXIMUM RATINGS

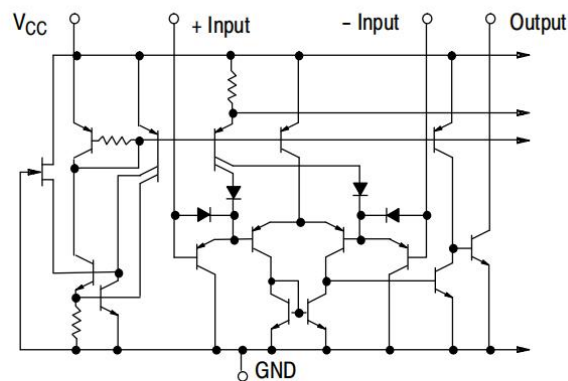
Rating	Symbol	Value	Unit
Power Supply Voltage LM239/LM339, E/LM2901, E, V MC3302	V_{CC}	+36 or ± 18 +30 or ± 15	Vdc
Input Differential Voltage Range LM239/LM339, E/LM2901, E, V MC3302	V_{IDR}	36 30	Vdc
Input Common Mode Voltage Range	V_{ICMR}	-0.3 to 36	Vdc
Output Short Circuit to Ground (Note 1)	I_{SC}	Continuous	
Power Dissipation @ $T_A = 25^\circ\text{C}$ Plastic Package Derate above 25°C	P_D $1/R_{\theta JA}$	1.0 8.0	W mW/ $^\circ\text{C}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Operating Ambient Temperature Range LM239 MC3302 LM2901, LM2901E LM2901V, NCV2901 LM339, LM339E	T_A	-25 to +85 -40 to +85 -40 to +105 -40 to +125 0 to +70	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

ESD RATINGS

Rating	HBM	MM	Unit
ESD Protection at any Pin (Human Body Model – HBM, Machine Model – MM) NCV2901	2000	200	V
LM339E, LM2901E	1500	200	V
LM339DG/DR2G, LM2901DG/DR2G	250	100	V
All Other Devices	1500	200	V



NOTE: Diagram shown is for 1 comparator.

Figure 1. Circuit Schematic



ELECTRICAL CHARACTERISTICS ($V_{CC} = +5.0$ Vdc, $T_A = +25^{\circ}\text{C}$, unless otherwise noted)

Characteristic	Symbol	LM239/339/339E			LM2901/2901E/2901V /NCV2901			MC3302			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage (Note 3)	V_{IO}	–	± 2.0	± 5.0	–	± 2.0	± 7.0	–	± 3.0	± 20	mVdc
Input Bias Current (Notes 3, 4) (Output in Analog Range)	I_{IB}	–	25	250	–	25	250	–	25	500	nA
Input Offset Current (Note 3)	I_{IO}	–	± 5.0	± 50	–	± 5.0	± 50	–	± 3.0	± 100	nA
Input Common Mode Voltage Range (Note 5)	V_{ICMR}	0	–	$V_{CC} - 1.5$	0	–	$V_{CC} - 1.5$	0	–	$V_{CC} - 1.5$	V
Supply Current	I_{CC}										mA
$R_L = \infty$ (For All Comparators)		–	0.8	2.0	–	0.8	2.0	–	0.8	2.0	
$R_L = \infty$, $V_{CC} = 30$ Vdc		–	1.0	2.5	–	1.0	2.5	–	1.0	2.5	
Voltage Gain $R_L \geq 15$ k Ω , $V_{CC} = 15$ Vdc	A_{VOL}	50	200	–	25	100	–	25	100	–	V/mV
Large Signal Response Time $V_I = \text{TTL Logic Swing}$, $V_{ref} = 1.4$ Vdc, $V_{RL} = 5.0$ Vdc, $R_L = 5.1$ k Ω	–	–	300	–	–	300	–	–	300	–	ns
Response Time (Note 6) $V_{RL} = 5.0$ Vdc, $R_L = 5.1$ k Ω	–	–	1.3	–	–	1.3	–	–	1.3	–	μs
Output Sink Current $V_I(-) \geq +1.0$ Vdc, $V_I(+) = 0$, $V_O \leq 1.5$ Vdc	I_{Sink}	6.0	16	–	6.0	16	–	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	–	130	400	–	130	500	mV
Output Leakage Current $V_I(+) \geq +1.0$ Vdc, $V_I(-) = 0$, $V_O = +5.0$ Vdc	I_{OL}	–	0.1	–	–	0.1	–	–	0.1	–	nA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

- (LM239) $T_{low} = -25^{\circ}\text{C}$, $T_{high} = +85^{\circ}$
(LM339, LM339E) $T_{low} = 0^{\circ}\text{C}$, $T_{high} = +70^{\circ}\text{C}$
(MC3302) $T_{low} = -40^{\circ}\text{C}$, $T_{high} = +85^{\circ}\text{C}$
(LM2901), LM2901E $T_{low} = -40^{\circ}\text{C}$, $T_{high} = +105^{\circ}$
(LM2901V & NCV2901) $T_{low} = -40^{\circ}\text{C}$, $T_{high} = +125^{\circ}\text{C}$
NCV2901 is qualified for automotive use.
- At the output switch point, $V_O \approx 1.4$ Vdc, $R_S \leq 100$ Ω 5.0 Vdc $\leq V_{CC} \leq 30$ Vdc, with the inputs over the full common mode range (0 Vdc to $V_{CC} - 1.5$ Vdc).
- The bias current flows out of the inputs due to the PNP input stage. This current is virtually constant, independent of the output state.
- Positive excursions of input voltage may exceed the power supply level. As long as one input voltage remains within the common mode range, the comparator will provide a proper output state. Refer to the Maximum Ratings table for safe operating area.
- The response time specified is for a 100 mV input step with 5.0 mV overdrive. For larger signals, 300 ns is typical.



PERFORMANCE CHARACTERISTICS ($V_{CC} = +5.0 \text{ Vdc}$, $T_A = T_{\text{low}}$ to T_{high} [Note 7])

Characteristic	Symbol	LM239/339/339E			LM2901/2901E/2901V /NCV2901			MC3302			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage (Note 8)	V_{IO}	–	–	± 9.0	–	–	± 15	–	–	± 40	mVdc
Input Bias Current (Notes 8, 9) (Output in Analog Range)	I_{IB}	–	–	400	–	–	500	–	–	1000	nA
Input Offset Current (Note 8)	I_{IO}	–	–	± 150	–	–	± 200	–	–	± 300	nA
Input Common Mode Voltage Range	V_{ICMR}	0	–	$V_{CC} - 2.0$	0	–	$V_{CC} - 2.0$	0	–	$V_{CC} - 2.0$	V
Saturation Voltage $V_{I(-)} \geq +1.0 \text{ Vdc}$, $V_{I(+)} = 0$, $I_{\text{sink}} \leq 4.0 \text{ mA}$	V_{sat}	–	–	700	–	–	700	–	–	700	mV
Output Leakage Current $V_{I(+)} \geq +1.0 \text{ Vdc}$, $V_{I(-)} = 0$, $V_O = 30 \text{ Vdc}$	I_{OL}	–	–	1.0	–	–	1.0	–	–	1.0	μA
Differential Input Voltage All $V_I \geq 0 \text{ Vdc}$	V_{ID}	–	–	V_{CC}	–	–	V_{CC}	–	–	V_{CC}	Vdc

7. (LM239) $T_{\text{low}} = -25^\circ\text{C}$, $T_{\text{high}} = +85^\circ$
 (LM339, LM339E) $T_{\text{low}} = 0^\circ\text{C}$, $T_{\text{high}} = +70^\circ\text{C}$
 (MC3302) $T_{\text{low}} = -40^\circ\text{C}$, $T_{\text{high}} = +85^\circ\text{C}$
 (LM2901, LM2901E) $T_{\text{low}} = -40^\circ\text{C}$, $T_{\text{high}} = +105^\circ$
 (LM2901V & NCV2901) $T_{\text{low}} = -40^\circ\text{C}$, $T_{\text{high}} = +125^\circ\text{C}$
 NCV2901 is qualified for automotive use.
8. At the output switch point, $V_O \approx 1.4 \text{ Vdc}$, $R_S \leq 100 \Omega$, $5.0 \text{ Vdc} \leq V_{CC} \leq 30 \text{ Vdc}$, with the inputs over the full common mode range (0 Vdc to $V_{CC} - 1.5 \text{ Vdc}$).
9. The bias current flows out of the inputs due to the PNP input stage. This current is virtually constant, independent of the output state.

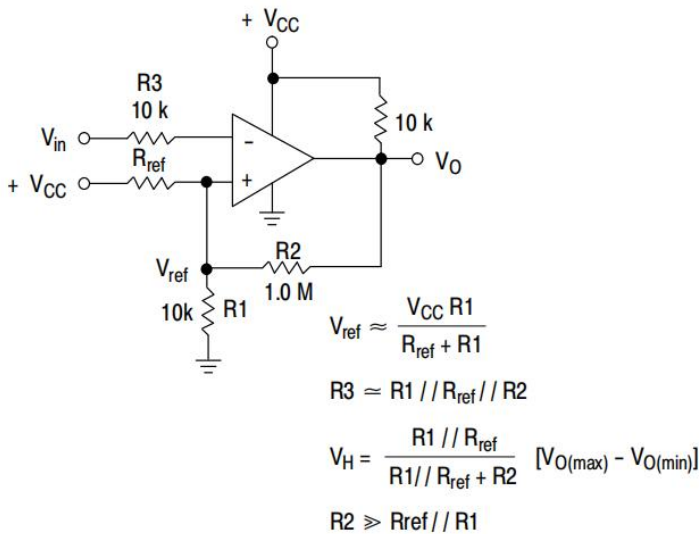


Figure 2. Inverting Comparator with Hysteresis

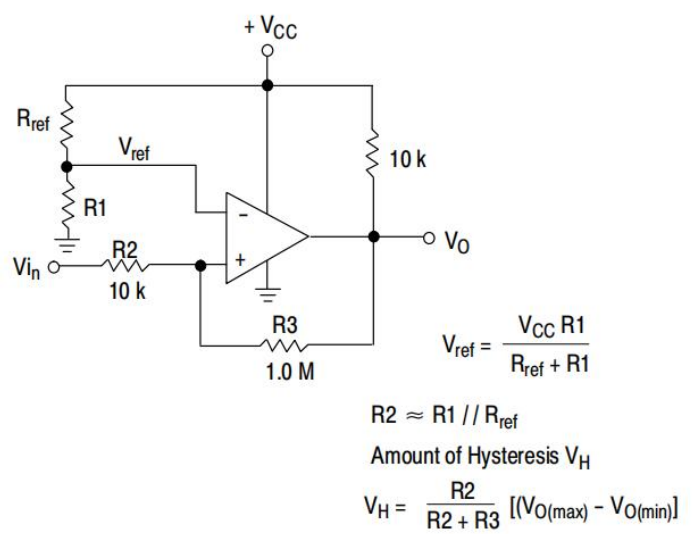


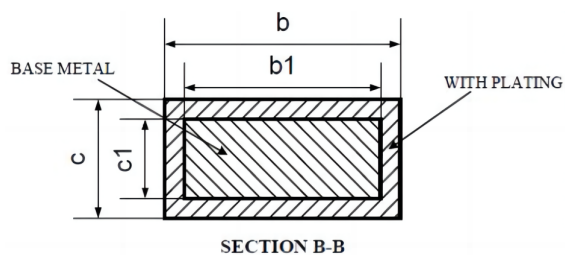
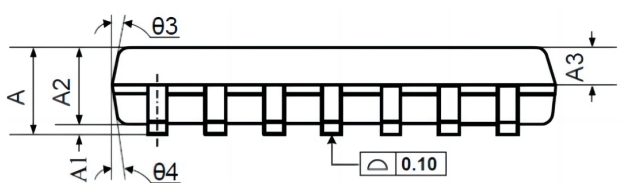
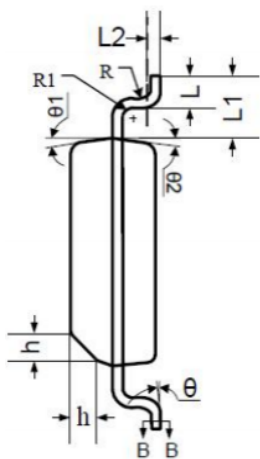
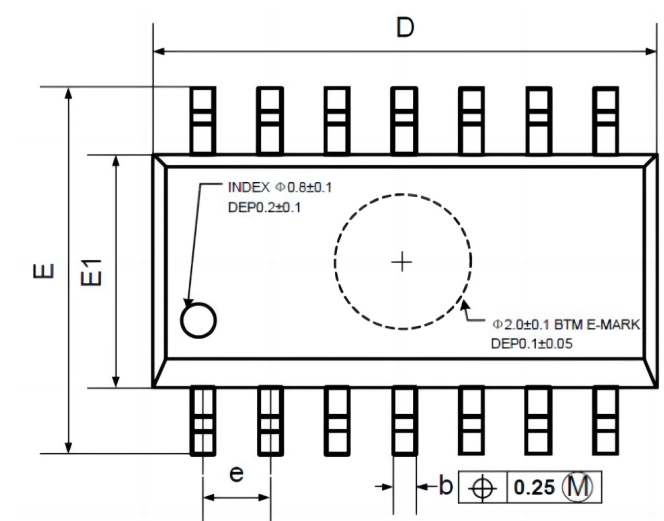
Figure 3. Noninverting Comparator with Hysteresis



ORDERING INFORMATION

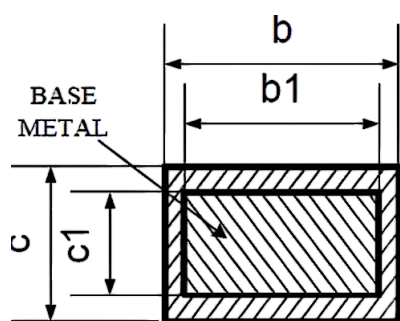
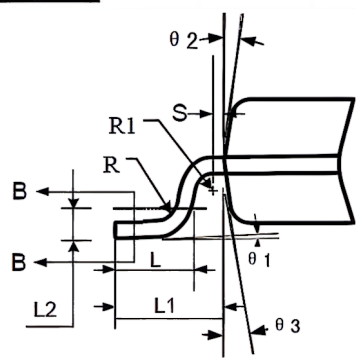
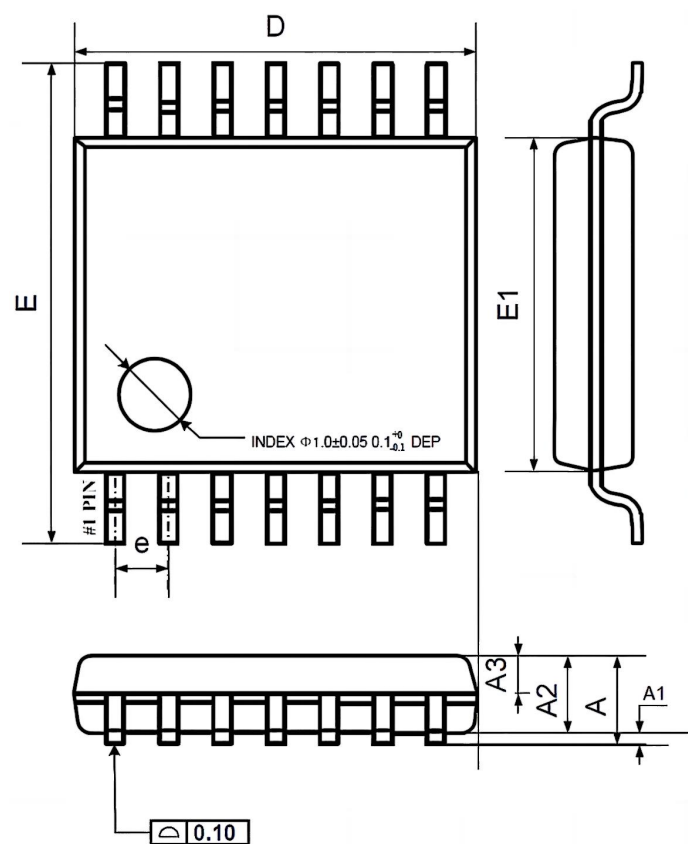
Order Number	Package	Package Quantity	MarkingOn The park
LM239DTBR2G-TUDI	TSSOP14	Tape,Reel,2500	239
LM239NG-TUDI	DIP14	Tube,25,A box of 1000	LM239N
LM339DR2G-TUDI	SOP14	Tape,Reel,2500	LM339DG
LM339EDR2G-TUDI	SOP14	Tape,Reel,2500	LM339EDG
LM339DTBR2G-TUDI	TSSOP14	Tape,Reel,2500	339
LM339NG-TUDI	DIP14	Tube,25,A box of 1000	LM339N
LM2901DR2G-TUDI	SOP14	Tape,Reel,2500	LM2901DG
LM2901EDR2G-TUDI	SOP14	Tape,Reel,2500	LM2901EDG
LM2901DTBR2G-TUDI	TSSOP14	Tape,Reel,2500	2901
LM2901NG-TUDI	DIP14	Tube,25,A box of 1000	LM2901N
LM2901VDR2G-TUDI	SOP14	Tape,Reel,2500	LM2901VDG
LM2901VDTBR2G-TUDI	TSSOP14	Tape,Reel,2500	2901V
LM2901VNG-TUDI	DIP14	Tube,25,A box of 1000	LM2901VN
NCV2901DR2G-TUDI	SOP14	Tape,Reel,2500	NCV2901DG
NCV2901DTBR2G-TUDI	TSSOP14	Tape,Reel,2500	NCV2901
MC3302DR2G-TUDI	SOP14	Tape,Reel,2500	MC3302DG
MC3302DTBR2G-TUDI	TSSOP14	Tape,Reel,2500	MC3302DG
MC3302PG-TUDI	DIP14	Tube,25,A box of 1000	MC3302P

Package SOP14



Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.36		0.49
b1	0.35	0.40	0.45
C	0.16		0.25
c1	0.15	0.20	0.25
D	8.53	8.63	8.73
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
R	0.07		
R1	0.07		
h	0.30	0.40	0.50
θ	0°		8°
θ1	6°	8°	10°
θ2	6°	8°	10°
θ3	5°	7°	9°
θ4	5°	7°	9°

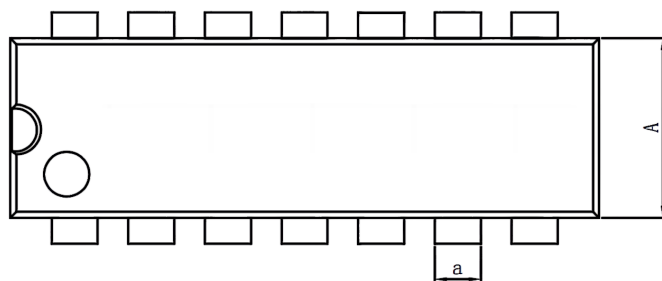
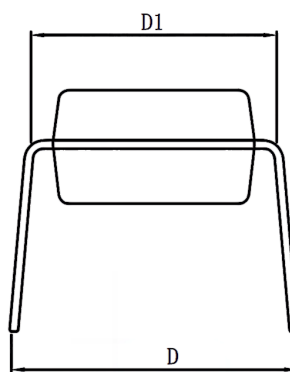
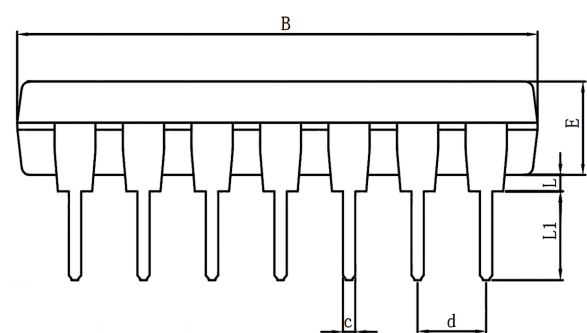
Package TSSOP14



Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	—	—	1.20
A1	0.05	—	0.15
A2	0.90	1.00	1.05
A3	0.34	0.44	0.54
b	0.20	—	0.28
b1	0.20	0.22	0.24
C	0.10	—	0.19
c1	0.10	0.13	0.15
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65 BSC		
L	0.45	0.60	0.75
L1	1.00 REF		
L2	0.25 BSC		
R	0.09	—	—
R1	0.09	—	—
S	0.20	—	—
θ1	0°	—	8°
θ2	10°	12°	14°
θ3	10°	12°	14°



Package DIP14



DIM.	MIN	TYP	MAX	DIM.	MIN	TYP	MAX
A	6.100	6.300	6.680	a	1.504	1.524	1.544
B	18.940	19.200	19.560	C	0.437	0.457	0.477
D	8.200	8.700	9.200	d	2.530	2.540	2.550
D1	7.42	7.62	7.82	L	0.500	—	0.800
E	3.100	3.300	3.550	L1	3.000	3.200	3.600



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