



钜地半导体
Tudi Semiconductor

Product Specification

TUDI-LM239A-EP

QUAD DIFFERENTIAL COMPARATOR

网址 www.sztdbdt.com 🔍

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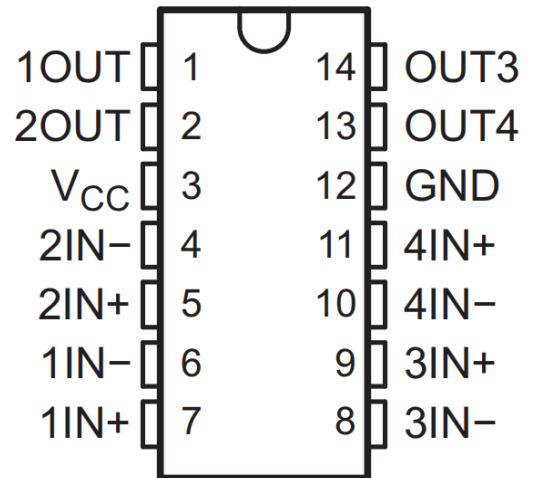
**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



FEATURES

- Wide Supply Ranges
 - Single Supply: 2 V to 36 V
(Tested to 30 V for Non-V Devices and 32 V for V-Suffix Devices)
 - Dual Supplies: ± 1 V to ± 18 V
(Tested to ± 15 V for Non-V Devices and ± 16 V for V-Suffix Devices)
- Low Supply-Current Drain Independent of Supply Voltage: 0.8 mA (Typ)
- Low Input Bias Current: 25 nA (Typ)
- Low Input Offset Current: 5 nA (Typ)
- Low Input Offset Voltage: 2 mV (Typ)
- Common-Mode Input Voltage Range Includes Ground
- Differential Input Voltage Range Equal to Maximum-Rated Supply Voltage: ± 36 V
- Low Output Saturation Voltage
- Output Compatible With TTL, MOS, and CMOS



APPLICATIONS

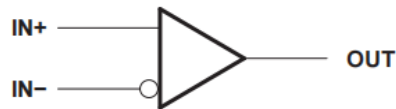
- Controlled Baseline
- One Assembly/Test Site
- One Fabrication Site
- Available in Military (– 55 ° C/125 ° C)
Temperature Range⁽¹⁾
- Extended Product Life Cycle
- Extended Product-Change Notification
- Product Traceability

DESCRIPTION

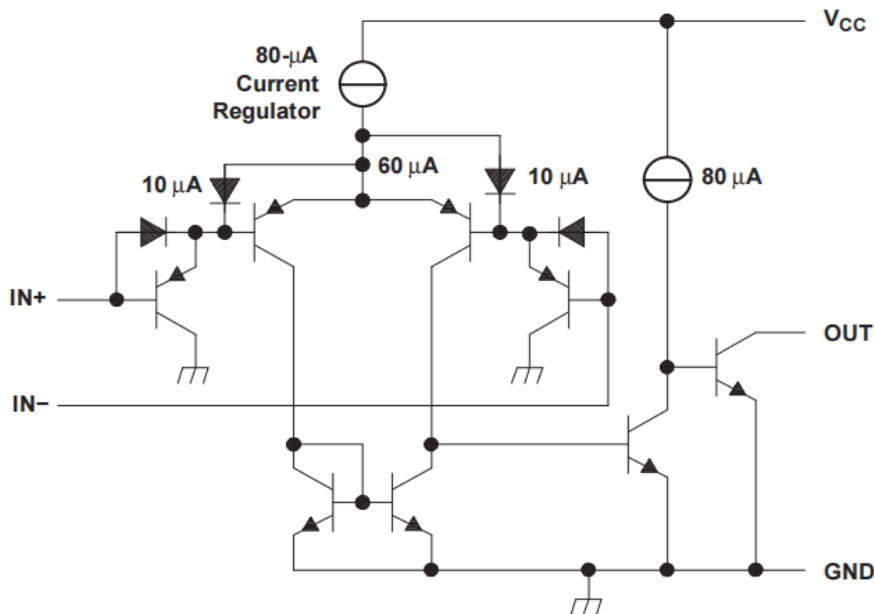
These devices consist of four independent voltage comparators that are designed to operate from a single power supply over a wide range of voltages. Operation from dual supplies also is possible, as long as the difference between the two supplies is 2 V to 36 V, and V_{CC} is at least 1.5 V more positive than the input common-mode voltage. Current drain is independent of the supply voltage. The outputs can be connected to other open-collector outputs to achieve wired-AND relationships.



SYMBOL (EACH COMPARATOR)



SCHEMATIC (EACH COMPARATOR)



All current values shown are nominal.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

over operating free-air temperature range (unless otherwise noted)

		MIN	MAX	UNIT
V _{CC}	Supply voltage ⁽²⁾		36	V
V _{ID}	Differential input voltage ⁽³⁾		±36	V
V _I	Input voltage range (either input)	-0.3	36	V
V _O	Output voltage		36	V
I _O	Output current		20	mA
	Duration of output short circuit to ground ⁽⁴⁾		Unlimited	
θ _{JA}	Package thermal impedance, junction to free air ^{(5) (6)}		86	°C/W
T _J	Operating virtual-junction temperature		136	°C
	Lead temperature 1,6 mm (1/16 in) from case for 10 s		260	°C
T _{stg}	Storage temperature range ⁽⁷⁾	-65	150	°C

- (1) Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) All voltage values, except differential voltages, are with respect to network ground.
- (3) Differential voltages are at IN+ with respect to IN-.
- (4) Short circuits from outputs to V_{CC} can cause excessive heating and eventual destruction.
- (5) Maximum power dissipation is a function of T_J (max), θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(\text{max}) - T_A) / \theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
- (6) The package thermal impedance is calculated in accordance with JESD 51-7.
- (7) Long term high-temperature storage and/or extended use at maximum recommended operating conditions may result in a reduction of overall device life. See http://www.ti.com/ep_quality for additional information on enhanced plastic packaging.



ELECTRICAL CHARACTERISTICS

at specified free-air temperature, $V_{CC} = 5\text{ V}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS ⁽¹⁾	T_A ⁽²⁾	MIN	TYP	MAX	UNIT
V_{IO} Input offset voltage	$V_{CC} = 5\text{ V to } 30\text{ V}$, $V_{IC} = V_{ICR\text{ min}}$, $V_O = 1.4\text{ V}$	25°C		1	2.5	mV
		Full range			5.5	
I_{IO} Input offset current	$V_O = 1.4\text{ V}$	25°C		5	50	nA
		Full range			150	
I_{IB} Input bias current	$V_O = 1.4\text{ V}$	25°C		-25	-250	nA
		Full range			-400	
V_{ICR} Common-mode input-voltage range ⁽³⁾		25°C		0 to $V_{CC} - 1.5$		V
		Full range		0 to $V_{CC} - 2$		
A_{VD} Large-signal differential-voltage amplification	$V_{CC} = 15\text{ V}$, $V_O = 1.4\text{ V to } 11.4\text{ V}$, $R_L \geq 15\text{ k}\Omega$ to V_{CC}	25°C		50	200	V/mV
I_{OH} High-level output current	$V_{ID} = 1\text{ V}$	$V_{OH} = 5\text{ V}$		0.1	50	nA
		$V_{OH} = 30\text{ V}$			1	μA
V_{OL} Low-level output voltage	$V_{ID} = -1\text{ V}$, $I_{OL} = 4\text{ mA}$	25°C		150	400	mV
		Full range			700	
I_{OL} Low-level output current	$V_{ID} = -1\text{ V}$, $V_{OL} = 1.5\text{ V}$	25°C		6	16	mA
I_{CC} Supply current (four comparators)	$V_O = 2.5\text{ V}$, No load	25°C		0.8	2	mA

(1) All characteristics are measured with zero common-mode input voltage, unless otherwise specified.

(2) Full range (MIN to MAX) for LM139 and LM139A is -55°C to 125°C. All characteristics are measured with zero common-mode input voltage, unless otherwise specified.

(3) The voltage at either input or common-mode should not be allowed to go negative by more than 0.3 V. The upper end of the common-mode voltage range is $V_{CC+} - 1.5\text{ V}$; however, one input can exceed V_{CC+} , and the comparator will provide a proper output state as long as the other input remains in the common-mode range. Either or both inputs can go to 30 V without damage.

SWITCHING CHARACTERISTICS

$V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
Response time	R_L connected to 5 V through 5.1 k Ω , $C_L = 15\text{ pF}$ ^{(1) (2)}	100-mV input step with 5-mV overdrive	1.3
		TTL-level input step	0.3

(1) C_L includes probe and jig capacitance.

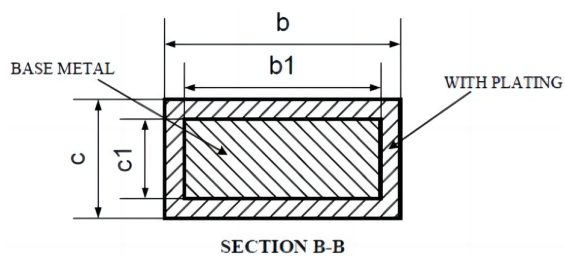
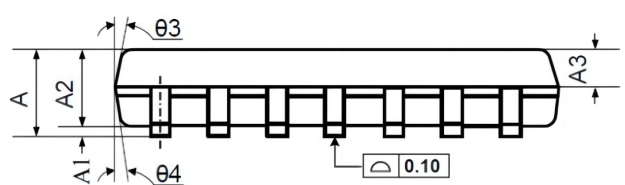
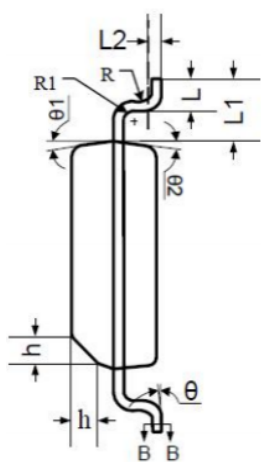
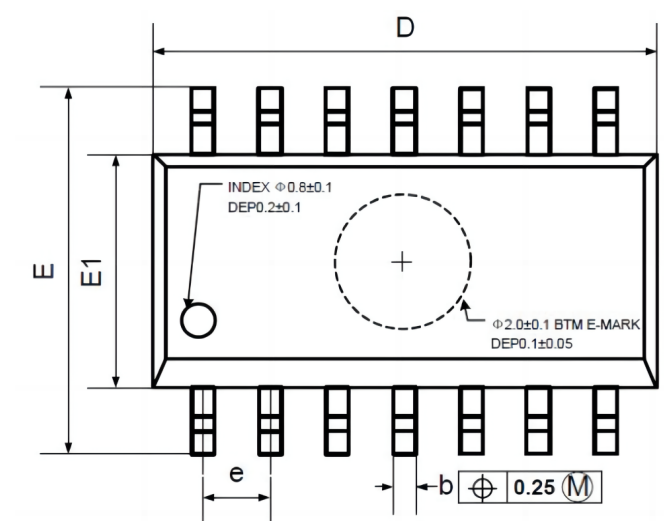
(2) The response time specified is the interval between the input step function and the instant when the output crosses 1.4 V.



ORDERING INFORMATION

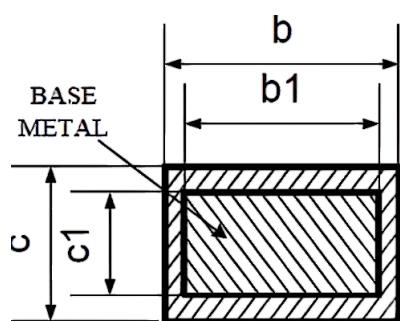
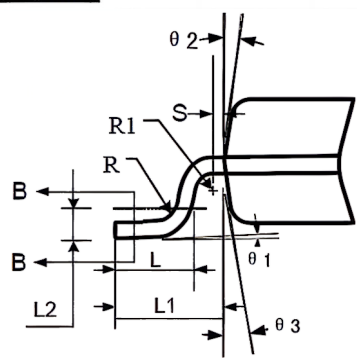
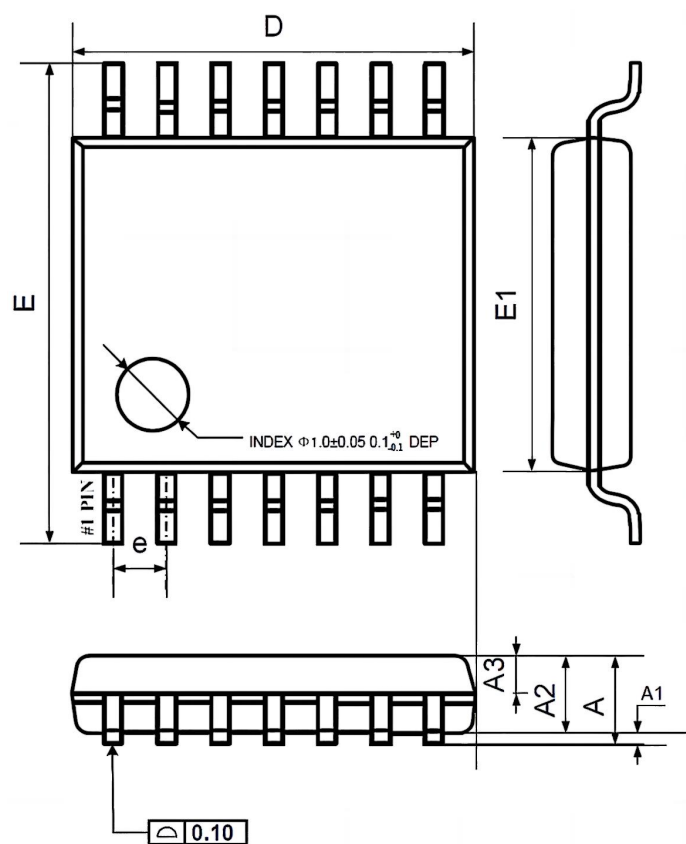
Order Number	Package	Package Quantity	Marking On The park	Temperature
LM239AMDREP	SOP14	Tape,Reel,2500	LM239AME	-55°C to 125°C
LM239AMPWREP	TSSOP14	Tape,Reel,2500	LM239AE	
LM239AQDREP	SOP14	Tape,Reel,2500	LM239AEP	-40°C to 125°C

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°



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