

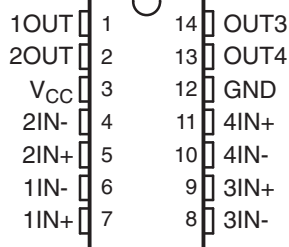
## QUAD DIFFERENTIAL COMPARATORS

Check for Samples: [LM139](#), [LM239](#), [LM339](#), [LM139A](#), [LM239A](#), [LM339A](#), [LM2901](#), [LM2901AV](#), [LM2901V](#)

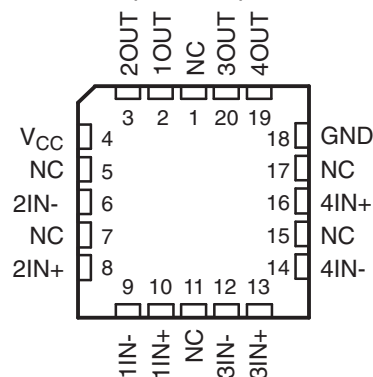
### FEATURES

- **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:  $\pm 1$  V to  $\pm 18$  V**  
(Tested to  $\pm 15$  V for Non-V Devices and  $\pm 16$  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: 3 nA (Typ) (LM139)**
- **Low Input Offset Voltage: 2 mV (Typ)**
- **Common-Mode Input Voltage Range Includes Ground**
- **Differential Input Voltage Range Equal to Maximum-Rated Supply Voltage:  $\pm 36$  V**
- **Low Output Saturation Voltage**
- **Output Compatible With TTL, MOS, and CMOS**

LM139, LM139A . . . D, J, OR W PACKAGE  
LM239 . . . D, N, OR PW PACKAGE  
LM239A . . . D PACKAGE  
LM339, LM339A . . . D, DB, N, NS, OR PW PACKAGE  
LM2901 . . . D, N, NS, OR PW PACKAGE  
(TOP VIEW)



LM139, LM139A . . . FK PACKAGE  
(TOP VIEW)



NC - No internal connection

### DESCRIPTION/ORDERING INFORMATION

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.

The LM139 and LM139A are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The LM239 and LM239A are characterized for operation from  $-25^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The LM339 and LM339A are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ . The LM2901, LM2901AV, and LM2901V are characterized for operation from  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ .



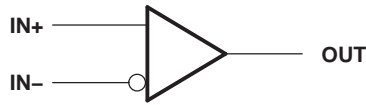
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

**Table 1. ORDERING INFORMATION<sup>(1)</sup>**

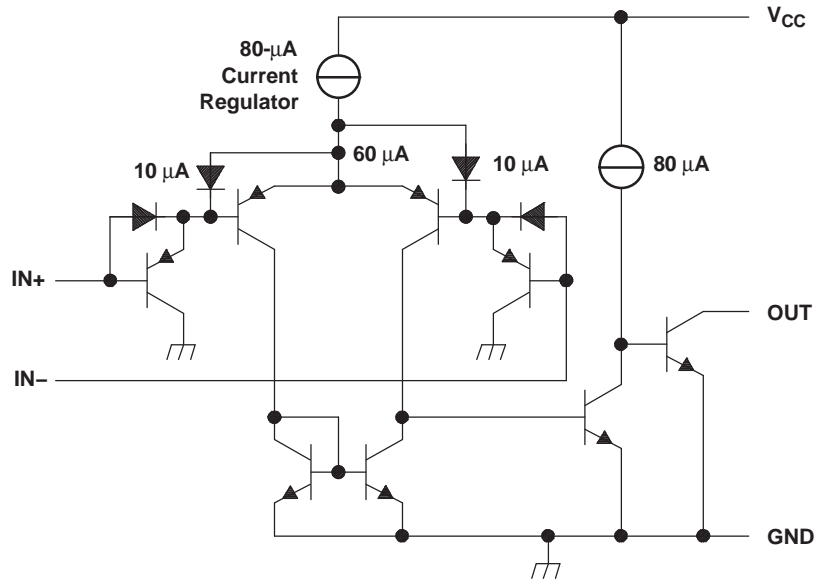
$T_A$	$V_{IOmax}$ AT 25°C	MAX $V_{CC}$	PACKAGE <sup>(2)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	5 mV	30 V	PDIP – N	Tube of 25	LM339N	LM339N
			SOIC – D	Tube of 50	LM339D	LM339
				Reel of 2500	LM339DR	
					LM339DRG3	
			SOP – NS	Reel of 2000	LM339NSR	LM339
			SSOP – DB	Reel of 2000	LM339DBR	LM339
			TSSOP – PW	Tube of 90	LM339PW	L339
	Reel of 2000	LM339PWRG3				
	2 mV	30 V	PDIP – N	Tube of 25	LM339AN	LM339AN
			SOIC – D	Tube of 50	LM339AD	LM339A
				Reel of 2500	LM339ADR	
			SOP – NS	Reel of 2000	LM339ANSR	LM339A
			SSOP – DB	Reel of 2000	LM339ADBR	L339A
			TSSOP – PW	Tube of 90	LM339APW	L339A
Reel of 2000				LM339APWR		
–25°C to 85°C	5 mV	30 V	PDIP – N	Tube of 25	LM239N	LM239N
			SOIC – D	Tube of 50	LM239D	LM239
				Reel of 2500	LM239DR	
					LM239DRG3	
			TSSOP – PW	Tube of 90	LM239PW	L239
	Reel of 2000	LM239PWR				
	2 mV	30 V	SOIC – D	Tube of 50	LM239AD	LM239A
			Reel of 2500	LM239ADR		
			TSSOP – PW	Tube of 90	LM2901PW	L2901
				Reel of 2000	LM2901PWRG3	
LM2901PWR						
–40°C to 125°C	7 mV	30 V	PDIP – N	Tube of 25	LM2901N	LM2901N
			SOIC – D	Tube of 50	LM2901D	LM2901
				Reel of 2500	LM2901DR	
					LM2901DRG3	
			SOP – NS	Reel of 2000	LM2901NSR	LM2901
	TSSOP – PW	Tube of 90	LM2901PW	L2901		
		Reel of 2000	LM2901PWRG3			
	7 mV	32 V	SOIC – D	Reel of 2500	LM2901VQDR	L2901V
			TSSOP – PW	Reel of 2000	LM2901VQPWR	L2901V
			SOIC – D	Reel of 2500	LM2901AVQDR	L2901AV
TSSOP – PW				Reel of 2000	LM2901AVQPWR	L2901AV
–55°C to 125°C			5 mV	30 V	CFP – W	Tube of 25
	CDIP – J	Tube of 25			LM139J	LM139J
	LCCC – FK	Tube of 55			LM139FK	LM139FK
	SOIC – D	Tube of 50			LM139D	LM139
		Reel of 2500			LM139DR	
	2 mV	30 V	CFP – W	Tube of 25	LM139AW	LM139AW
			CDIP – J	Tube of 25	LM139AJ	LM139AJ
			LCCC – FK	Tube of 55	LM139AFK	LM139AFK
			SOIC – D	Tube of 50	LM139AD	LM139AD
				Reel of 2500	LM139ADR	

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at [www.ti.com](http://www.ti.com).  
 (2) Package drawings, thermal data, and symbolization are available at [www.ti.com/packaging](http://www.ti.com/packaging).

**SYMBOL (EACH COMPARATOR)**



**SCHEMATIC (EACH COMPARATOR)**



All current values shown are nominal.

## ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

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

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage <sup>(2)</sup>		36	V
V <sub>ID</sub>	Differential input voltage <sup>(3)</sup>		±36	V
V <sub>I</sub>	Input voltage range (either input)	–0.3	36	V
V <sub>O</sub>	Output voltage		36	V
I <sub>O</sub>	Output current		20	mA
Duration of output short circuit to ground <sup>(4)</sup>			Unlimited	
θ <sub>JA</sub>	Package thermal impedance, junction to free air <sup>(5) (6)</sup>	D package	86	°C/W
		DB package	96	
		N package	80	
		NS package	76	
		PW package	113	
θ <sub>JC</sub>	Package thermal impedance, junction to case <sup>(7) (8)</sup>	FK package	5.61	°C/W
		J package	15.05	
		W package	14.65	
T <sub>J</sub>	Operating virtual-junction temperature		150	°C
	Case temperature for 60 s	FK package	260	°C
	Lead temperature 1,6 mm (1/16 in) from case for 60 s	J package	300	°C
T <sub>stg</sub>	Storage temperature range	–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<sub>CC</sub> can cause excessive heating and eventual destruction.
- (5) Maximum power dissipation is a function of T<sub>J</sub> (max), θ<sub>JA</sub>, and T<sub>A</sub>. The maximum allowable power dissipation at any allowable ambient temperature is P<sub>D</sub> = (T<sub>J</sub> (max) – T<sub>A</sub>)/θ<sub>JA</sub>. Operating at the absolute maximum T<sub>J</sub> of 150°C can affect reliability.
- (6) The package thermal impedance is calculated in accordance with JEDEC 51-7.
- (7) Maximum power dissipation is a function of T<sub>J</sub> (max), θ<sub>JC</sub>, and T<sub>C</sub>. The maximum allowable power dissipation at any allowable case temperature is P<sub>D</sub> = (T<sub>J</sub> (max) – T<sub>C</sub>)/θ<sub>JC</sub>. Operating at the absolute maximum T<sub>J</sub> of 150°C can affect reliability.
- (8) The package thermal impedance is calculated in accordance with MIL-STD-883.

## ELECTRICAL CHARACTERISTICS

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

PARAMETER	TEST CONDITIONS <sup>(1)</sup>	$T_A$ <sup>(2)</sup>	LM139			LM139A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
$V_{IO}$ 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		2	5		1	2	mV
		Full range			9			4	
$I_{IO}$ Input offset current	$V_O = 1.4\text{ V}$	25°C		3	25		3	25	nA
		Full range			100			100	
$I_{IB}$ Input bias current	$V_O = 1.4\text{ V}$	25°C		-25	-100		-25	-100	nA
		Full range			-300			-300	
$V_{ICR}$ Common-mode input-voltage range <sup>(3)</sup>		25°C		0 to $V_{CC} - 1.5$			0 to $V_{CC} - 1.5$		V
		Full range		0 to $V_{CC} - 2$			0 to $V_{CC} - 2$		
$A_{VD}$ Large-signal differential-voltage amplification	$V_{CC+} = \pm 7.5\text{ V}$ , $V_O = -5\text{ V to } 5\text{ V}$	25°C		200		50	200	V/mV	
$I_{OH}$ High-level output current	$V_{ID} = 1\text{ V}$	$V_{OH} = 5\text{ V}$	25°C		0.1		0.1	nA	
		$V_{OH} = 30\text{ V}$	Full range			1		1	$\mu\text{A}$
$V_{OL}$ Low-level output voltage	$V_{ID} = -1\text{ V}$ , $I_{OL} = 4\text{ mA}$	25°C		150	400		150	400	mV
		Full range			700			700	
$I_{OL}$ Low-level output current	$V_{ID} = -1\text{ V}$ , $V_{OL} = 1.5\text{ V}$	25°C		6	16		6	16	mA
$I_{CC}$ Supply current (four comparators)	$V_O = 2.5\text{ V}$ , No load	25°C		0.8	2		0.8	2	mA

- All characteristics are measured with zero common-mode input voltage, unless otherwise specified.
- Full range (MIN to MAX) for LM139 and LM139A is  $-55^\circ\text{C}$  to  $125^\circ\text{C}$ . All characteristics are measured with zero common-mode input voltage, unless otherwise specified.
- 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	LM139 LM139A	UNIT
		TYP	
Response time	$R_L$ connected to 5 V through 5.1 k $\Omega$ , $C_L = 15\text{ pF}$ <sup>(1) (2)</sup>	100-mV input step with 5-mV overdrive	1.3
		TTL-level input step	0.3

- $C_L$  includes probe and jig capacitance.
- The response time specified is the interval between the input step function and the instant when the output crosses 1.4 V.

## ELECTRICAL CHARACTERISTICS

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

PARAMETER	TEST CONDITIONS <sup>(1)</sup>	$T_A$ <sup>(2)</sup>	LM239 LM339			LM239A LM339A			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
$V_{IO}$ 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		2	5		1	3	mV	
		Full range			9			4		
$I_{IO}$ Input offset current	$V_O = 1.4\text{ V}$	25°C		5	50		5	50	nA	
		Full range			150			150		
$I_{IB}$ Input bias current	$V_O = 1.4\text{ V}$	25°C		-25	-250		-25	-250	nA	
		Full range			-400			-400		
$V_{ICR}$ Common-mode input-voltage range <sup>(3)</sup>		25°C	0 to $V_{CC} - 1.5$			0 to $V_{CC} - 1.5$			V	
		Full range	0 to $V_{CC} - 2$			0 to $V_{CC} - 2$				
$A_{VD}$ Large-signal differential-voltage amplification	$V_{CC} = 15\text{ V}$ , $V_O = 1.4\text{ V to }11.4\text{ V}$ , $R_L \geq 15\text{ k}\Omega\text{ to }V_{CC}$	25°C		50	200		50	200	V/mV	
$I_{OH}$ High-level output current	$V_{ID} = 1\text{ V}$	$V_{OH} = 5\text{ V}$	25°C		0.1	50		0.1	50	nA
		$V_{OH} = 30\text{ V}$	Full range			1			1	$\mu\text{A}$
$V_{OL}$ Low-level output voltage	$V_{ID} = -1\text{ V}$ , $I_{OL} = 4\text{ mA}$	25°C		150	400		150	400	mV	
		Full range			700			700		
$I_{OL}$ Low-level output current	$V_{ID} = -1\text{ V}$ , $V_{OL} = 1.5\text{ V}$	25°C		6	16		6	16	mA	
$I_{CC}$ Supply current (four comparators)	$V_O = 2.5\text{ V}$ , No load	25°C		0.8	2		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 LM239/LM239A is  $-25^\circ\text{C}$  to  $85^\circ\text{C}$ , and for LM339/LM339A is  $0^\circ\text{C}$  to  $70^\circ\text{C}$ . 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	LM239 LM239A LM339 LM339A		UNIT
		TYP		
Response time	$R_L$ connected to 5 V through 5.1 k $\Omega$ , $C_L = 15\text{ pF}$ <sup>(1) (2)</sup>	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.

## ELECTRICAL CHARACTERISTICS

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

PARAMETER	TEST CONDITIONS <sup>(1)</sup>		$T_A$ <sup>(2)</sup>	LM2901			UNIT
				MIN	TYP	MAX	
$V_{IO}$ Input offset voltage	$V_{IC} = V_{ICR}\text{ min.}$ $V_O = 1.4\text{ V}$ , $V_{CC} = 5\text{ V to MAX}^{(3)}$	Non-A devices	25°C	2	7	mV	
			Full range		15		
		A-suffix devices	25°C	1	2		
			Full range		4		
$I_{IO}$ Input offset current	$V_O = 1.4\text{ V}$		25°C	5	50	nA	
			Full range		200		
$I_{IB}$ Input bias current	$V_O = 1.4\text{ V}$		25°C	-25	-250	nA	
			Full range		-500		
$V_{ICR}$ Common-mode input-voltage range <sup>(4)</sup>			25°C	0 to $V_{CC} - 1.5$		V	
			Full range	0 to $V_{CC} - 2$			
$A_{VD}$ Large-signal differential-voltage amplification	$V_{CC} = 15\text{ V}$ , $V_O = 1.4\text{ V to } 11.4\text{ V}$ , $R_L \geq 15\text{ k}\Omega\text{ to } V_{CC}$		25°C	25	100	V/mV	
$I_{OH}$ High-level output current	$V_{ID} = 1\text{ V}$		$V_{OH} = 5\text{ V}$	25°C	0.1	50	nA
			$V_{OH} = V_{CC}\text{ MAX}^{(3)}$	Full range		1	$\mu\text{A}$
$V_{OL}$ Low-level output voltage	$V_{ID} = -1\text{ V}$ , $I_{OL} = 4\text{ mA}$		Non-V devices	25°C	150	500	mV
			V-suffix devices		150	400	
			All devices		Full range		
$I_{OL}$ 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		$V_{CC} = 5\text{ V}$	25°C	0.8	2	mA
			$V_{CC} = \text{MAX}^{(3)}$		1	2.5	

- (1) All characteristics are measured with zero common-mode input voltage, unless otherwise specified.  
 (2) Full range (MIN to MAX) for LM2901 is  $-40^\circ\text{C}$  to  $125^\circ\text{C}$ . All characteristics are measured with zero common-mode input voltage, unless otherwise specified.  
 (3)  $V_{CC}\text{ MAX} = 30\text{ V}$  for non-V devices, and  $32\text{ V}$  for V-suffix devices  
 (4) The voltage at either input or common-mode should not be allowed to go negative by more than  $0.3\text{ V}$ . 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  $V_{CC}\text{ MAX}$  without damage.

## SWITCHING CHARACTERISTICS

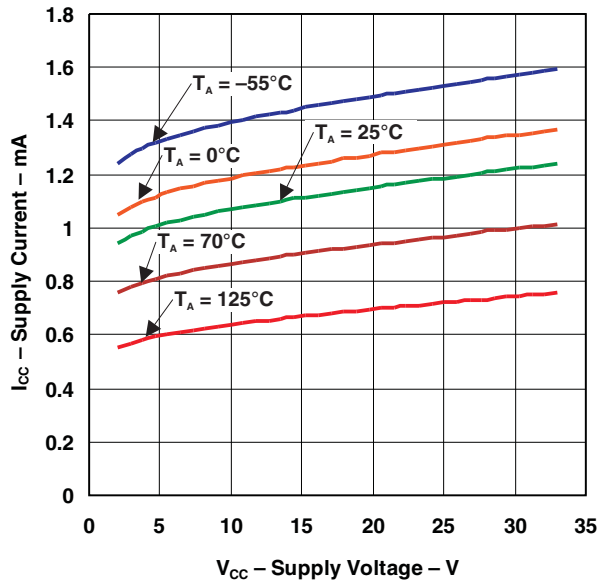
 $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ 

PARAMETER	TEST CONDITIONS		LM2901	UNIT
			TYP	
Response time	$R_L$ connected to $5\text{ V}$ through $5.1\text{ k}\Omega$ , $C_L = 15\text{ pF}^{(1)}\text{ }^{(2)}$	100-mV input step with 5-mV overdrive	1.3	$\mu\text{s}$
		TTL-level input step	0.3	

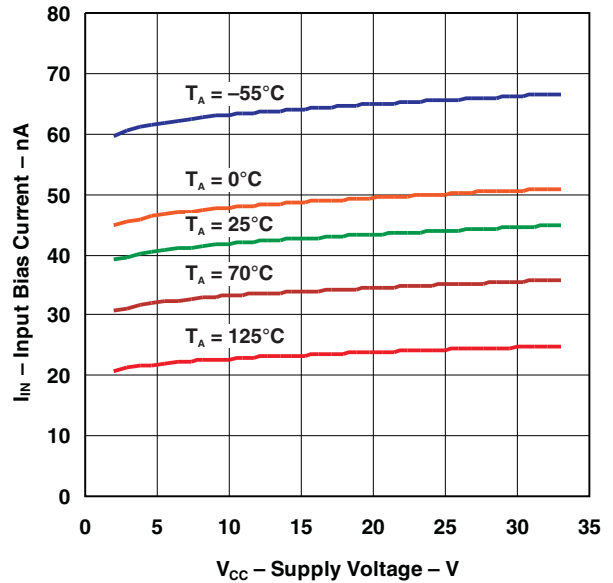
- (1)  $C_L$  includes probe and jig capacitance.  
 (2) The response time specified is the interval between the input step function and the instant when the output crosses  $1.4\text{ V}$ .

TYPICAL CHARACTERISTICS

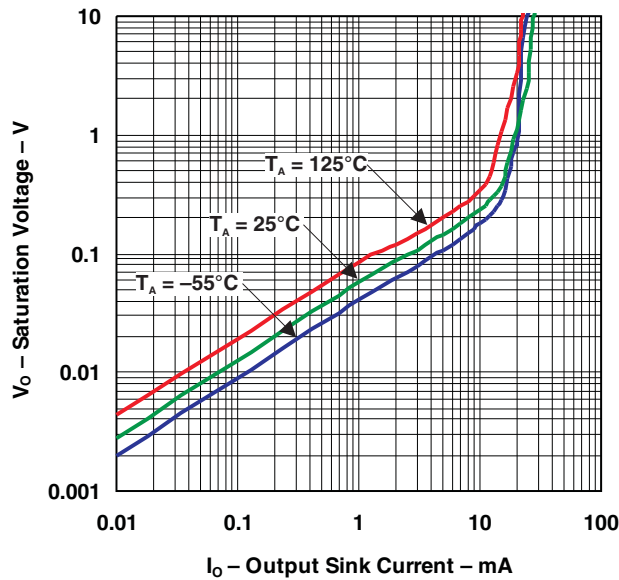
SUPPLY CURRENT  
vs  
SUPPLY VOLTAGE



INPUT BIAS CURRENT  
vs  
SUPPLY VOLTAGE



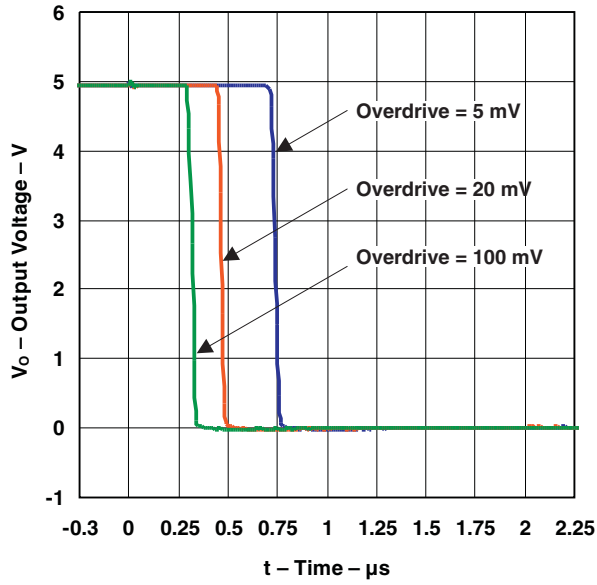
OUTPUT SATURATION VOLTAGE



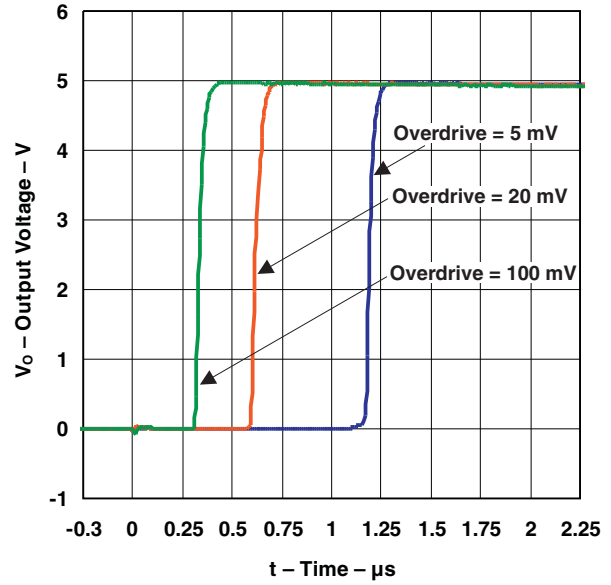


TYPICAL CHARACTERISTICS (continued)

RESPONSE TIME FOR VARIOUS OVERDRIVES  
NEGATIVE TRANSITION



RESPONSE TIME FOR VARIOUS OVERDRIVES  
POSITIVE TRANSITION



## REVISION HISTORY

Changes from Revision R (July 2010) to Revision S	Page
• Updated ORDERING INFORMATION table. ....	<a href="#">2</a>

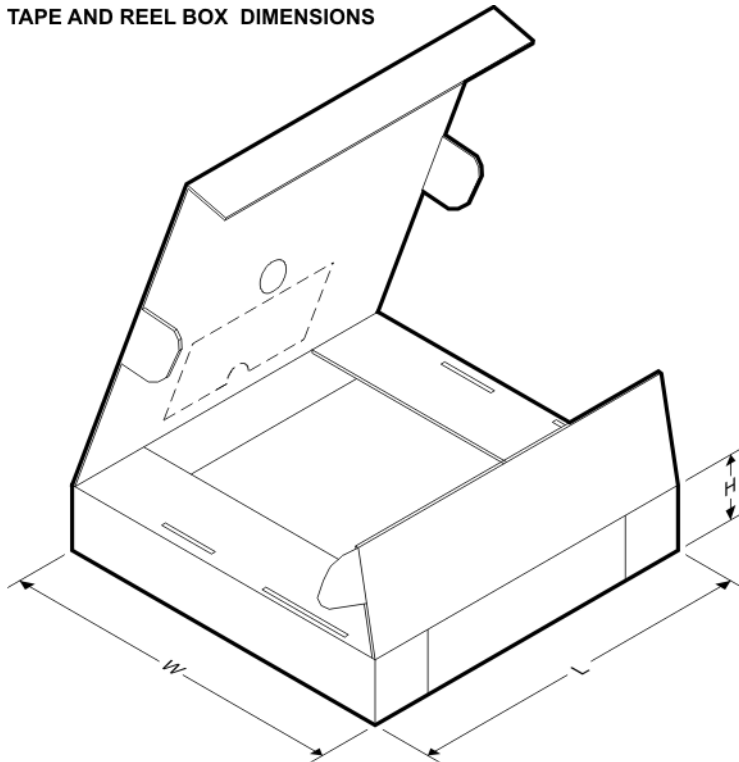
**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LM139ADR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM139DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM239ADR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM239ADR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM239DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM239DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM239DRG4	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM239PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM2901AVQPWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM2901AVQPWRG4	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM2901DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM2901DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM2901DRG4	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM2901NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
LM2901PWR	TSSOP	PW	14	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
LM2901PWRG3	TSSOP	PW	14	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
LM2901PWRG4	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM2901VQPWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LM2901VQPWRG4	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM339ADBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
LM339ADR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM339ADR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM339ADRG4	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM339ANSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
LM339APWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM339DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM339DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM339DRG4	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
LM339PWR	TSSOP	PW	14	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
LM339PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
LM339PWRG3	TSSOP	PW	14	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
LM339PWRG4	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM139ADR	SOIC	D	14	2500	367.0	367.0	38.0
LM139DR	SOIC	D	14	2500	367.0	367.0	38.0
LM239ADR	SOIC	D	14	2500	333.2	345.9	28.6

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM239ADR	SOIC	D	14	2500	367.0	367.0	38.0
LM239DR	SOIC	D	14	2500	367.0	367.0	38.0
LM239DR	SOIC	D	14	2500	333.2	345.9	28.6
LM239DRG4	SOIC	D	14	2500	333.2	345.9	28.6
LM239PWR	TSSOP	PW	14	2000	367.0	367.0	35.0
LM2901AVQPWR	TSSOP	PW	14	2000	367.0	367.0	35.0
LM2901AVQPWRG4	TSSOP	PW	14	2000	367.0	367.0	35.0
LM2901DR	SOIC	D	14	2500	367.0	367.0	38.0
LM2901DR	SOIC	D	14	2500	333.2	345.9	28.6
LM2901DRG4	SOIC	D	14	2500	333.2	345.9	28.6
LM2901NSR	SO	NS	14	2000	367.0	367.0	38.0
LM2901PWR	TSSOP	PW	14	2000	364.0	364.0	27.0
LM2901PWRG3	TSSOP	PW	14	2000	364.0	364.0	27.0
LM2901PWRG4	TSSOP	PW	14	2000	367.0	367.0	35.0
LM2901VQPWR	TSSOP	PW	14	2000	367.0	367.0	35.0
LM2901VQPWRG4	TSSOP	PW	14	2000	367.0	367.0	35.0
LM339ADBR	SSOP	DB	14	2000	367.0	367.0	38.0
LM339ADR	SOIC	D	14	2500	367.0	367.0	38.0
LM339ADR	SOIC	D	14	2500	333.2	345.9	28.6
LM339ADRG4	SOIC	D	14	2500	333.2	345.9	28.6
LM339ANSR	SO	NS	14	2000	367.0	367.0	38.0
LM339APWR	TSSOP	PW	14	2000	367.0	367.0	35.0
LM339DR	SOIC	D	14	2500	367.0	367.0	38.0
LM339DR	SOIC	D	14	2500	333.2	345.9	28.6
LM339DRG4	SOIC	D	14	2500	333.2	345.9	28.6
LM339PWR	TSSOP	PW	14	2000	364.0	364.0	27.0
LM339PWR	TSSOP	PW	14	2000	367.0	367.0	35.0
LM339PWRG3	TSSOP	PW	14	2000	364.0	364.0	27.0
LM339PWRG4	TSSOP	PW	14	2000	367.0	367.0	35.0

J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)

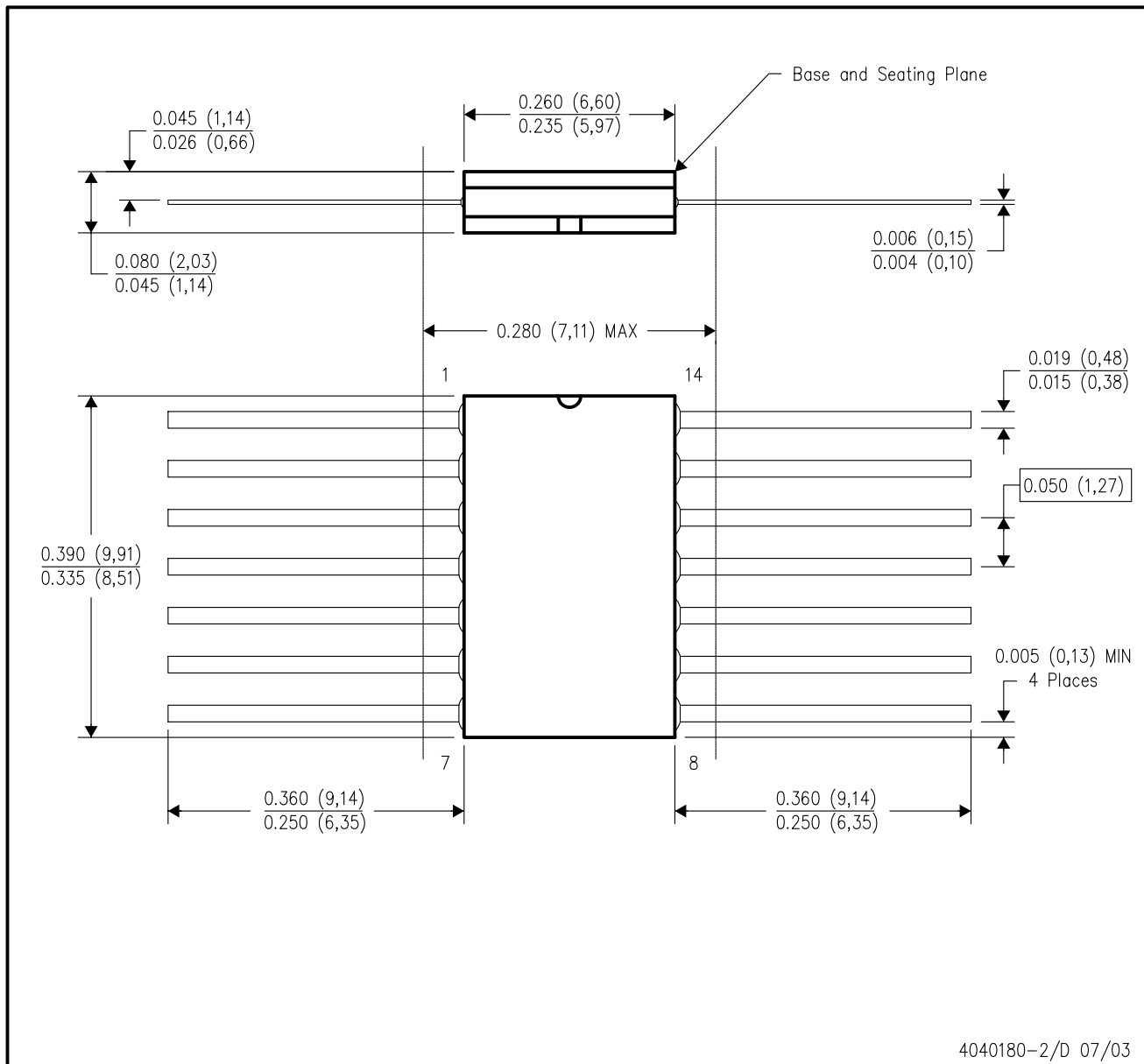


4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



4040180-2/D 07/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only.
  - E. Falls within MIL STD 1835 GDFP1-F14 and JEDEC MO-092AB

FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a metal lid.
  - Falls within JEDEC MS-004



N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  -  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4040064-3/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
  -  Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

# MECHANICAL DATA

NS (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

DB (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-150