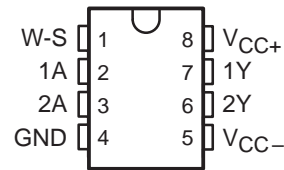


# uA9636AC DUAL LINE DRIVER WITH ADJUSTABLE SLEW RATE

SLLS110B – OCTOBER 1980 – REVISED MAY 1995

- Meets or Exceeds the Requirements of ANSI Standards EIA/TIA-423-B and -232-E and ITU Recommendations V.10 and V.28
- Output Slew Rate Control
- Output Short-Circuit-Current Limiting
- Wide Supply Voltage Range
- 8-Pin Package
- Designed to Be Interchangeable With National DS9636A

D OR P PACKAGE  
(TOP VIEW)

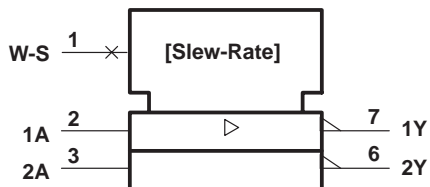


## description

The uA9636AC is a dual, single-ended line driver designed to meet ANSI Standards EIA/TIA-423-B and EIA/TIA-232-E and ITU Recommendations V.10 and V.28. The slew rates of both amplifiers are controlled by a single external resistor,  $R_{(WS)}$ , connected between the wave-shape-control (W-S) terminal and GND. Output current limiting is provided. Inputs are compatible with TTL and CMOS and are diode protected against negative transients. This device operates from  $\pm 12$  V and is supplied in an 8-pin package.

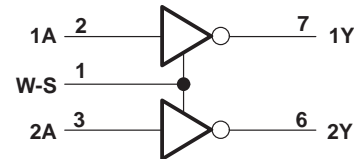
The uA9636AC is characterized for operation from 0°C to 70°C.

## logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## logic diagram



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS  
INSTRUMENTS**

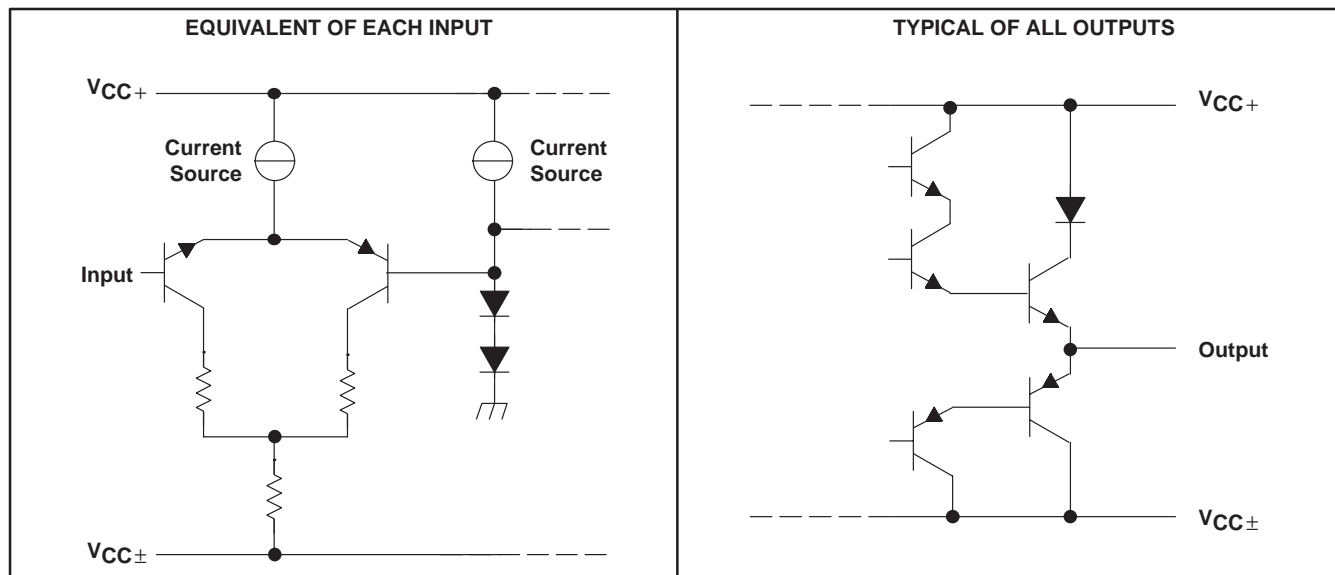
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# uA9636AC DUAL LINE DRIVER WITH ADJUSTABLE SLEW RATE

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## schematics of inputs and outputs



### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Positive supply voltage range, $V_{CC+}$ (see Note 1)	$V_{CC-}$ to 15 V
Negative supply voltage range, $V_{CC-}$	0.5 V to -15 V
Output voltage, $V_O$	$\pm 15$ V
Output current, $I_O$	$\pm 150$ mA
Continuous total power dissipation	See Dissipation Rating Table
Operating free-air temperature range, $T_A$	0°C to 70°C
Storage temperature range, $T_{stg}$	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

† 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.

NOTE 1: All voltage values are with respect to the network ground terminal.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING
D	725 mW	5.8 mW/°C	464 mW
P	1000 mW	8.0 mW/°C	640 mW

### recommended operating conditions

	MIN	NOM	MAX	UNIT
Positive supply voltage, $V_{CC+}$	10.8	12	13.2	V
Negative supply voltage, $V_{CC-}$	-10.8	-12	-13.2	V
High-level input voltage, $V_{IH}$	2			V
Low-level input voltage, $V_{IL}$			0.8	V
Wave-shaping resistor, $R_{(WS)}$	10		1000	k $\Omega$
Operating free-air temperature, $T_A$	0		70	°C



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# uA9636AC

## DUAL LINE DRIVER WITH ADJUSTABLE SLEW RATE

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**electrical characteristics over recommended ranges of free-air temperature, supply voltage, and wave-shaping resistance (unless otherwise noted)**

PARAMETER		TEST CONDITIONS		MIN	TYP <sup>†</sup>	MAX	UNIT
V <sub>IK</sub>	Input clamp voltage	I <sub>I</sub> = -15 mA		-1.1	-1.5		V
V <sub>OH</sub>	High-level output voltage	V <sub>I</sub> = 0.8 V	R <sub>L</sub> = ∞	5	5.6	6	V
			R <sub>L</sub> = 3 kΩ to GND	5	5.6	6	
			R <sub>L</sub> = 450 Ω to GND	4	5.4	6	
V <sub>OL</sub>	Low-level output voltage	V <sub>I</sub> = 2 V	R <sub>L</sub> = ∞	-6 <sup>‡</sup>	-5.7	-5	V
			R <sub>L</sub> = 3 kΩ to GND	-6 <sup>‡</sup>	-5.6	-5	
			R <sub>L</sub> = 450 Ω to GND	-6 <sup>‡</sup>	-5.4	-4	
I <sub>IH</sub>	High-level input current	V <sub>I</sub> = 2.4 V				10	μA
		V <sub>I</sub> = 5.5 V				100	
I <sub>IL</sub>	Low-level input current	V <sub>I</sub> = 0.4 V		-20	-80		μA
I <sub>O</sub>	Output current (power off)	V <sub>CC±</sub> = 0, V <sub>O</sub> = ±6 V				±100	μA
I <sub>OS</sub>	Short-circuit output current <sup>§</sup>	V <sub>I</sub> = 2 V		15	25	150	mA
		V <sub>I</sub> = 0		-15	-40	-150	
r <sub>O</sub>	Output resistance	R <sub>L</sub> = 450 Ω			25	50	Ω
I <sub>CC+</sub>	Positive supply current	V <sub>CC</sub> = ±12 V, R <sub>(WS)</sub> = 100 kΩ,	V <sub>I</sub> = 0, Output open		13	18	mA
I <sub>CC-</sub>	Negative supply current	V <sub>CC</sub> = ±12 V, R <sub>(WS)</sub> = 100 kΩ,	V <sub>I</sub> = 0, Output open		-13	-18	mA

<sup>†</sup> All typical values are at V<sub>CC</sub> = ±12 V, T<sub>A</sub> = 25°C.

<sup>‡</sup> The algebraic convention, in which the less-positive (more-negative) limit is designated as minimum, is used in this data sheet for logic voltage levels, e.g., when -5 V is the maximum, the minimum is a more-negative voltage.

<sup>§</sup> Not more than one output should be shorted to ground at a time.

### switching characteristics, V<sub>CC±</sub> = ±12 V, T<sub>A</sub> = 25°C (see Figure 1)

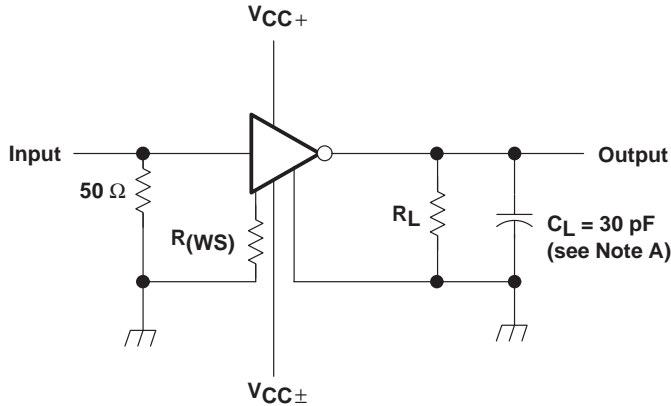
PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t <sub>TLH</sub>	Transition time, low- to high-level output	R <sub>L</sub> = 450 kΩ, C <sub>L</sub> = 30 pF	R <sub>(WS)</sub> = 10 kΩ	0.8	1.1	1.4	μs
			R <sub>(WS)</sub> = 100 kΩ	8	11	14	
			R <sub>(WS)</sub> = 500 kΩ	40	55	70	
			R <sub>(WS)</sub> = 1 MΩ	80	110	140	
t <sub>THL</sub>	Transition time, high- to low-level output	R <sub>L</sub> = 450 kΩ, C <sub>L</sub> = 30 pF	R <sub>(WS)</sub> = 10 kΩ	0.8	1.1	1.4	μs
			R <sub>(WS)</sub> = 100 kΩ	8	11	14	
			R <sub>(WS)</sub> = 500 kΩ	40	55	70	
			R <sub>(WS)</sub> = 1 MΩ	80	110	140	



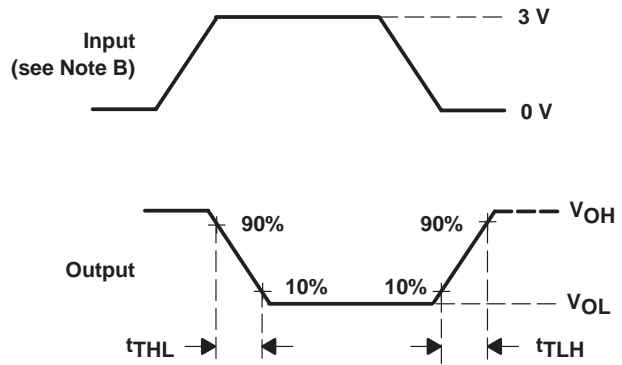
# uA9636AC DUAL LINE DRIVER WITH ADJUSTABLE SLEW RATE

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## PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. The input pulse is supplied by a generator having the following characteristics:  $t_r \leq 10$  ns,  $t_f \leq 10$  ns,  $Z_0 = 50 \Omega$ ,  $PRR \leq 1$  kHz, duty cycle = 50%.

Figure 1. Test Circuit and Voltage Waveforms

## TYPICAL CHARACTERISTICS

OUTPUT VOLTAGE  
vs  
INPUT VOLTAGE

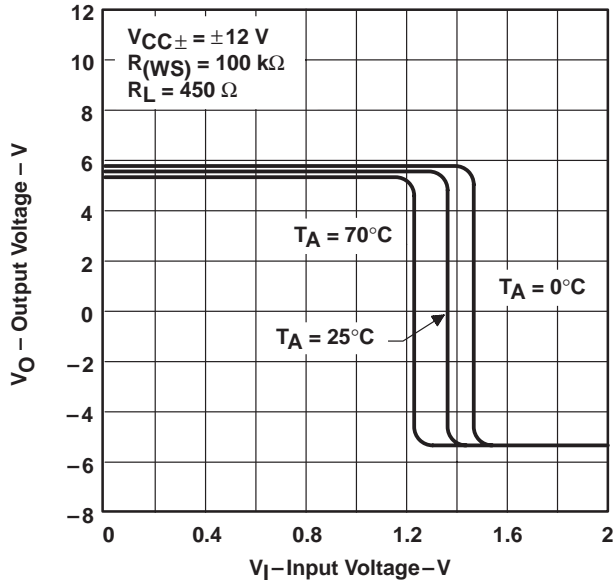


Figure 2

INPUT CURRENT  
vs  
INPUT VOLTAGE

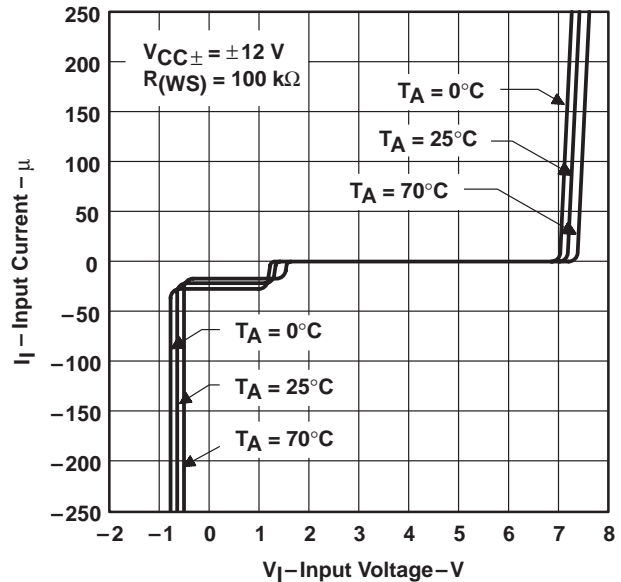
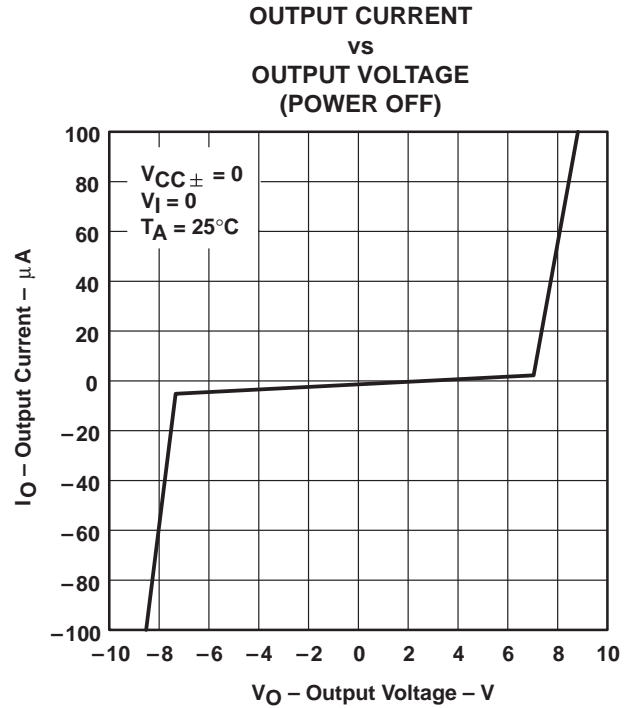
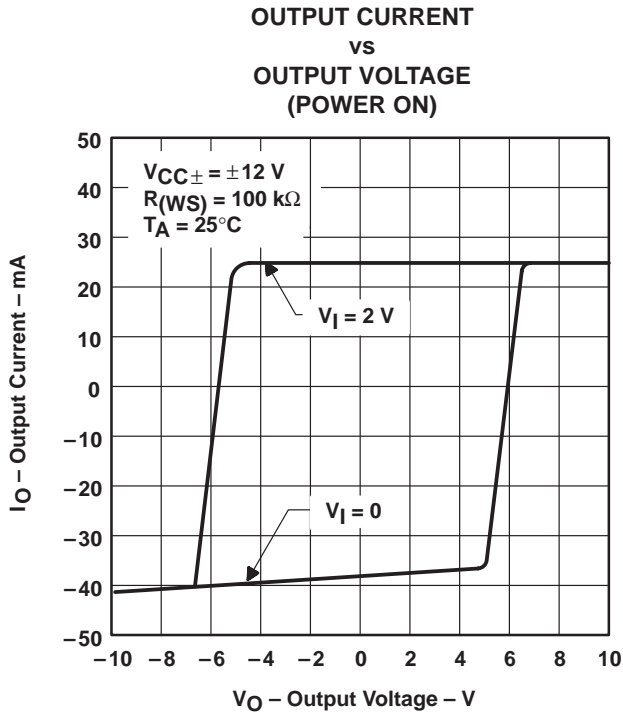
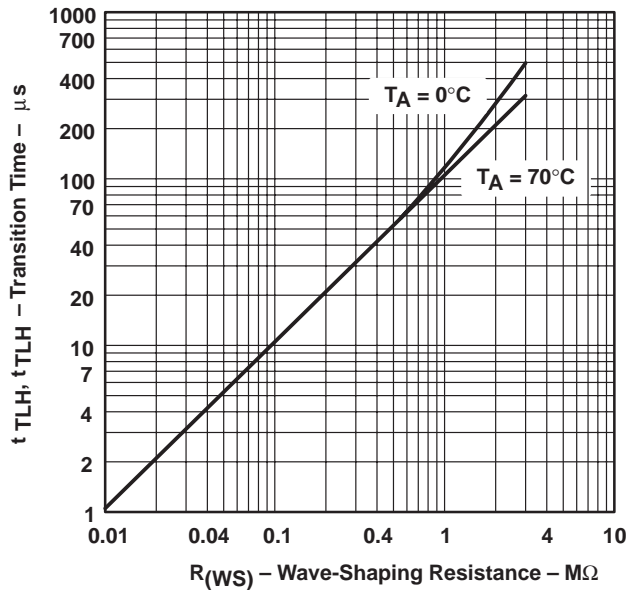


Figure 3

**TYPICAL CHARACTERISTICS**



**TRANSITION TIME  
vs  
WAVE-SHAPING RESISTANCE**



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## APPLICATION INFORMATION

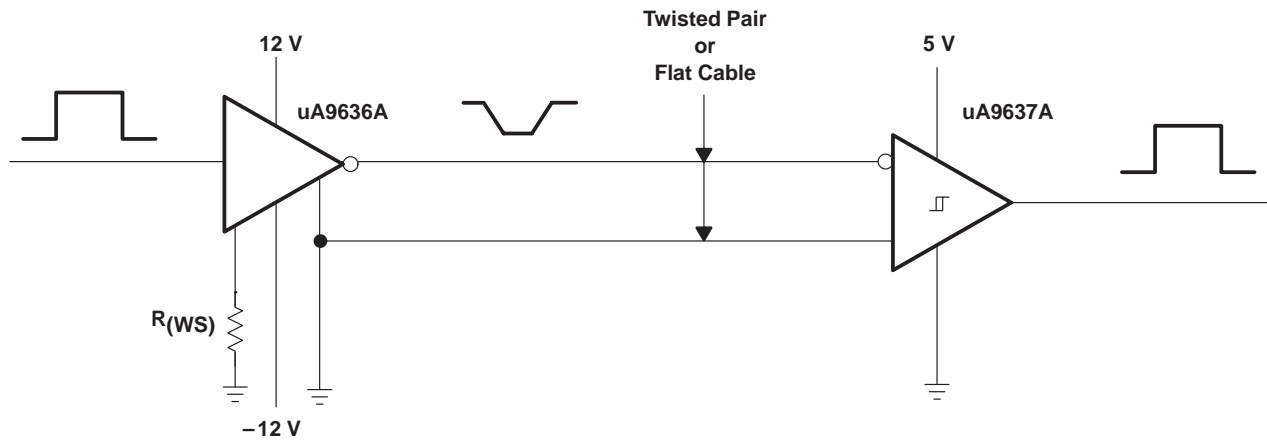


Figure 7. EIA/TIA-423-B System Application

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