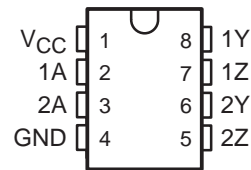


uA9638C DUAL HIGH-SPEED DIFFERENTIAL LINE DRIVER

SLLS112C – OCTOBER 1980 – REVISED APRIL 1994

- **Meets or Exceeds ANSI Standard EIA/TIA-422-B**
- **Operates From a Single 5-V Power Supply**
- **Drives Loads as Low as 50 Ω up to 15 Mbps**
- **TTL- and CMOS-Input Compatibility**
- **Output Short-Circuit Protection**
- **Interchangeable With National Semiconductor™ DS9638**

**D OR P PACKAGE
(TOP VIEW)**



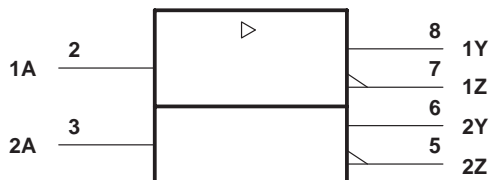
description

The uA9638C is a dual high-speed differential line driver designed to meet ANSI Standard EIA/TIA-422-B. The inputs are TTL and CMOS compatible and have input clamp diodes. Schottky-diode-clamped transistors are used to minimize propagation delay time. This device operates from a single 5-V power supply and is supplied in an 8-pin package.

The uA9638 provides the current needed to drive low-impedance loads at high speeds. Typically used with twisted-pair cabling and differential receiver(s), base-band data transmission can be accomplished up to and exceeding 15 Mbps in properly designed systems. The uA9637A dual line receiver is commonly used as the receiver. For even faster switching speeds in the same pin configuration, see the SN75ALS191.

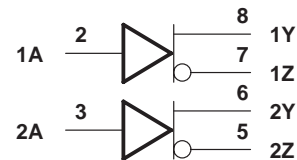
The uA9638C is characterized for operation from 0°C to 70°C.

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**

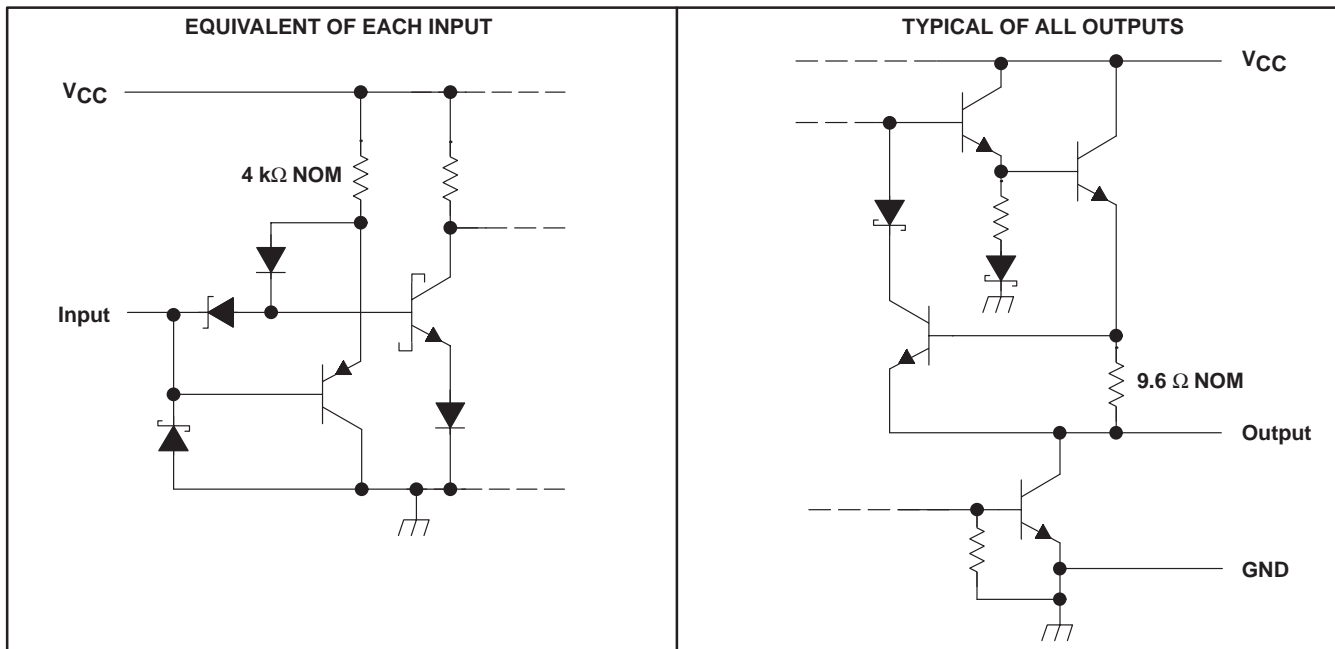
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schematics of inputs and outputs



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

Supply voltage range, V_{CC} (see Note 1)	.....	-0.5 V to 7 V
Input voltage range, V_I	.....	-0.5 V to 7 V
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 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: Voltage values except differential output voltages are with respect to network GND.

DISSIPATION RATING TABLE

PACKAGE	$T_A = 25^\circ\text{C}$ 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
Supply voltage, V_{CC}	4.75	5	5.25	V
High-level input voltage, V_{IH}	2			V
Low-level input voltage, V_{IL}			0.8	V
High-level output current, I_{OH}			-50	mA
Low-level output current, I_{OL}			50	mA
Operating free-air temperature, T_A	0		70	°C



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

PARAMETER		TEST CONDITIONS		MIN	TYP [†]	MAX	UNIT	
V_{IK}	Input clamp voltage	$V_{CC} = 4.75 \text{ V}$, $I_I = -18 \text{ mA}$		-1	-1.2		V	
V_{OH}	High-level output voltage	$V_{CC} = 4.75 \text{ V}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = 0.8 \text{ V}$	$I_{OH} = -10 \text{ mA}$	2.5	3.5		V	
			$I_{OH} = -40 \text{ mA}$	2				
V_{OL}	Low-level output voltage	$V_{CC} = 4.75 \text{ V}$, $V_{IH} = 2 \text{ V}$, $I_{OL} = 40 \text{ mA}$	$V_{IL} = 0.8 \text{ V}$			0.5	V	
$|V_{OD1}|$	Magnitude of differential output voltage	$V_{CC} = 5.25 \text{ V}$, $I_O = 0$				$2V_{OD2}$	V	
$|V_{OD2}|$	Magnitude of differential output voltage			2			V	
$\Delta|V_{OD}|$	Change in magnitude of differential output voltage [‡]	$V_{CC} = 4.75 \text{ V to } 5.25 \text{ V}$, See Figure 1	$R_L = 100 \Omega$			± 0.4	V	
V_{OC}	Common-mode output voltage [§]						3	V
$\Delta|V_{OC}|$	Change in magnitude of common-mode output voltage [‡]						± 0.4	V
I_O	Output current with power off	$V_{CC} = 0$	$V_O = 6 \text{ V}$		0.1	100	μA	
			$V_O = -0.25 \text{ V}$		-0.1	-100		
			$V_O = -0.25 \text{ V to } 6 \text{ V}$			± 100		
I_I	Input current	$V_{CC} = 5.25 \text{ V}$, $V_I = 5.5 \text{ V}$				50	μA	
I_{IH}	High-level input current	$V_{CC} = 5.25 \text{ V}$, $V_I = 2.7 \text{ V}$				25	μA	
I_{IL}	Low-level input current	$V_{CC} = 5.25 \text{ V}$, $V_I = 0.5 \text{ V}$				-200	μA	
I_{OS}	Short-circuit output current [¶]	$V_{CC} = 5.25 \text{ V}$, $V_O = 0$		-50		-150	mA	
I_{CC}	Supply current (both drivers)	$V_{CC} = 5.25 \text{ V}$, No load, All inputs at 0 V			45	65	mA	

[†] All typical values are at $V_{CC} = 5 \text{ V}$ and $T_A = 25^\circ\text{C}$.

[‡] $\Delta|V_{OD}|$ and $\Delta|V_{OC}|$ are the changes in magnitude of V_{OD} and V_{OC} , respectively, that occur when the input is changed from a high level to a low level or vice versa.

[§] In Standard EIA-422-A, V_{OC} , which is the average of the two output voltages with respect to ground, is called output offset voltage, V_{OS} .

[¶] Only one output at a time should be shorted, and duration of the short circuit should not exceed one second.

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

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
$t_d(\text{OD})$	Differential output delay time	$C_L = 15 \text{ pF}$, $R_L = 100 \Omega$	See Figure 2		10	20	ns
$t_t(\text{OD})$	Differential output transition time				10	20	
$t_{sk(o)}$	Output skew	See Figure 2			1		ns



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PARAMETER MEASUREMENT INFORMATION

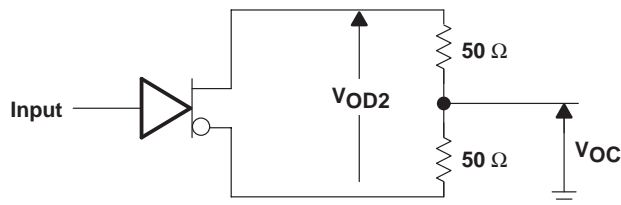
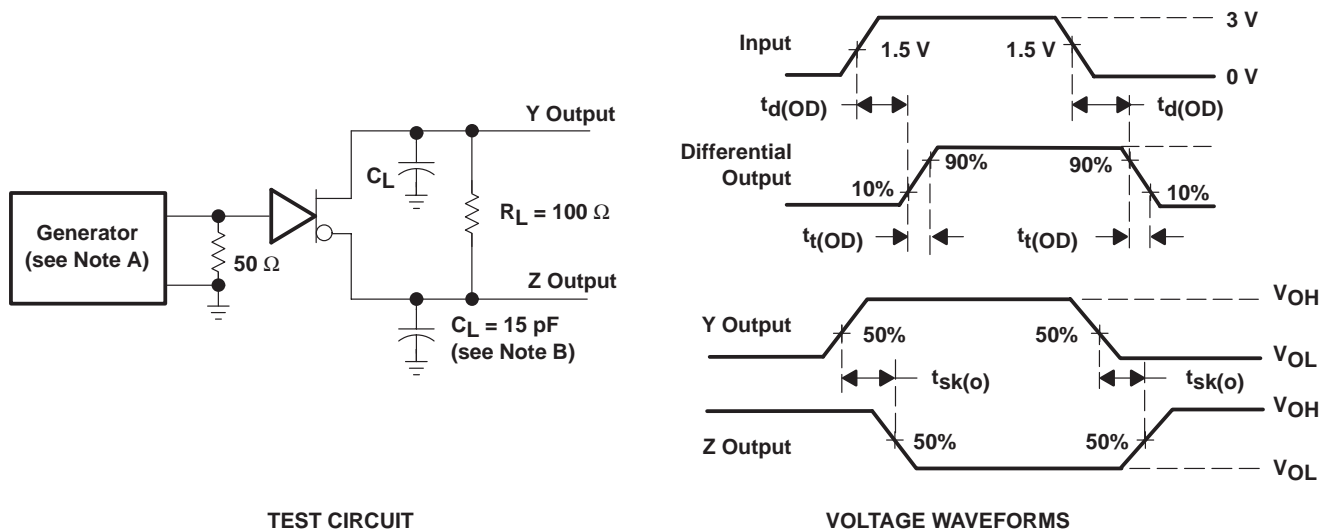


Figure 1. Differential and Common-Mode Output Voltages



TEST CIRCUIT

VOLTAGE WAVEFORMS

NOTES: A. The input pulse generator has the following characteristics: $Z_O = 50 \Omega$, $PRR \leq 500 \text{ kHz}$, $t_W = 100 \text{ ns}$, $t_r = \leq 5 \text{ ns}$.
B. C_L includes probe and jig capacitance.

Figure 2. Test Circuit and Voltage Waveforms

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