

DS9637A Dual Differential Line Receiver

Check for Samples: [DS9637A](#)

FEATURES

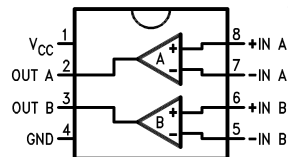
- Dual Channel
- Single 5V Supply
- Satisfies EIA Standards RS-422 and RS423
- Built-in ± 35 mV Hysteresis
- High Input Common Mode Voltage Range
- High Input impedance
- TTL Compatible Outputs
- Schottky Technology
- Extended Temperature Range

DESCRIPTION

The DS9637A is a Schottky dual differential line receiver which has been specifically designed to satisfy the requirements of EIA Standards RS-422 and RS-423. In addition, the DS9637A satisfies the requirements of MIL-STD 188-114 and is compatible with the International Standard CCITT recommendations. The DS9637A is suitable for use as a line receiver in digital data systems, using either single ended or differential, unipolar or bipolar transmission. It requires a single 5V power supply and has Schottky TTL compatible outputs. The DS9637A has an operational input common mode range of $\pm 7V$ either differentially or to ground.

Connection Diagram

Top View



**Figure 1. 8-Lead SOIC (D Package)
8-Lead PDIP (P Package)
For Complete Military Product Specifications,
refer to the appropriate SMD or MDS.
8-Lead CDIP (NAB Package)**



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These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings⁽¹⁾⁽²⁾

Storage Temperature Range	
CDIP	–65°C to + 175°C
PDIP	–65°C to + 150°C
Lead Temperature CDIP (Soldering, 30 seconds)	300°C
PDIP and SOIC Packages (Soldering, 10 seconds)	265°C
Maximum Power Dissipation ⁽³⁾ at 25°C	
CDIP	1300 mW
PDIP	930 mW
SOIC	810 mW
V _{CC} Lead Potential to Ground	–0.5V to 7.0V
Input Potential to Ground	±15V
Differential Input Voltage	±15V
Output Potential to Ground	–0.5V to +5.5V
Output Sink Current	50 mA
ESD Susceptibility, HBM	≥2 kV

- (1) Absolute Maximum Ratings are those values beyond which the safety of the device cannot be ensured. They are not meant to imply that the devices should be operated at these limits. The tables of “[Electrical Characteristics](#)” provide conditions for actual device operation.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/ Distributors for availability and specifications.
- (3) Derate CDIP 8.7 mW/°C above 25°C; derate PDIP 7.5 mW/°C above 25°C; derate SOIC package 6.5 mW/°C above 25°C.

Recommended Operating Conditions

DS9637AM	Min	Max	Units
Supply Voltage (V _{CC})	4.5	5.5	V
Operating Temperature (T _A)	–55	+125	°C
DS9637AC			
Supply Voltage (V _{CC})	4.75	5.25	V
Operating Temperature (T _A)	0	+70	°C

Electrical Characteristics⁽¹⁾⁽²⁾

Over recommended operating temperature and supply voltage ranges, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{TH}	Differential Input Threshold Voltage ⁽³⁾	$-7.0V \leq V_{CM} \leq +7.0V$	-0.2		+0.2	V
$V_{TH(R)}$	Differential Input Threshold Voltage ⁽⁴⁾	$-7.0V \leq V_{CM} \leq +7.0V$	-0.4		+0.4	V
I_I	Input Current ⁽⁵⁾	$V_I = 10V, 0V \leq V_{CC} \leq +5.5V$		1.1	3.25	mA
		$V_I = -10V, 0V \leq V_{CC} \leq +5.5V$		-1.6	-3.25	mA
V_{OL}	Output Voltage LOW	$I_{OL} = 20\text{ mA}, V_{CC} = \text{Min}$		0.35	0.5	V
V_{OH}	Output Voltage HIGH	$I_{OH} = -1.0\text{ mA}, V_{CC} = \text{Min}$	2.5	3.5		V
I_{OS}	Output Short Circuit Current ⁽⁶⁾	$V_O = 0V, V_{CC} = \text{Max}$	-40	-75	-100	mA
I_{CC}	Supply Current	$V_{CC} = \text{Max}, V_{I+} = 0.5V,$		35	50	mA
		$V_{I-} = \text{GND}$				
V_{HYST}	Input Hysteresis	$V_{CM} = \pm 7.0V$ (See Curves)		70		mV

- (1) Unless otherwise specified Min/Max limits apply across the -55°C to $+125^{\circ}\text{C}$ temperature range for DS9637AM and across the 0°C to $+70^{\circ}\text{C}$ range for the DS9637ASC. All typicals are given for $V_{CC} = 5V$ and $T_A = 25^{\circ}\text{C}$.
- (2) All currents into the device pins are positive; all currents out of the device pins are negative. All voltages are referenced to ground unless otherwise specified.
- (3) V_{DIFF} (Differential Input Voltage) = $(V_{I+}) - (V_{I-})$. V_{CM} (Common Mode Input Voltage) = V_{I+} or V_{I-} .
- (4) $500\Omega \pm 1\%$ in series with inputs.
- (5) The input not under test is tied to ground.
- (6) Only one output at a time should be shorted.

Switching Characteristics

$V_{CC} = 5.0V, T_A = 25^{\circ}\text{C}$

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PLH}	Propagation Delay Time Low to High	See AC Test Circuit		15	25	ns
t_{PHL}	Propagation Delay Time High to Low	See AC Test Circuit		13	25	ns

Equivalent Circuit

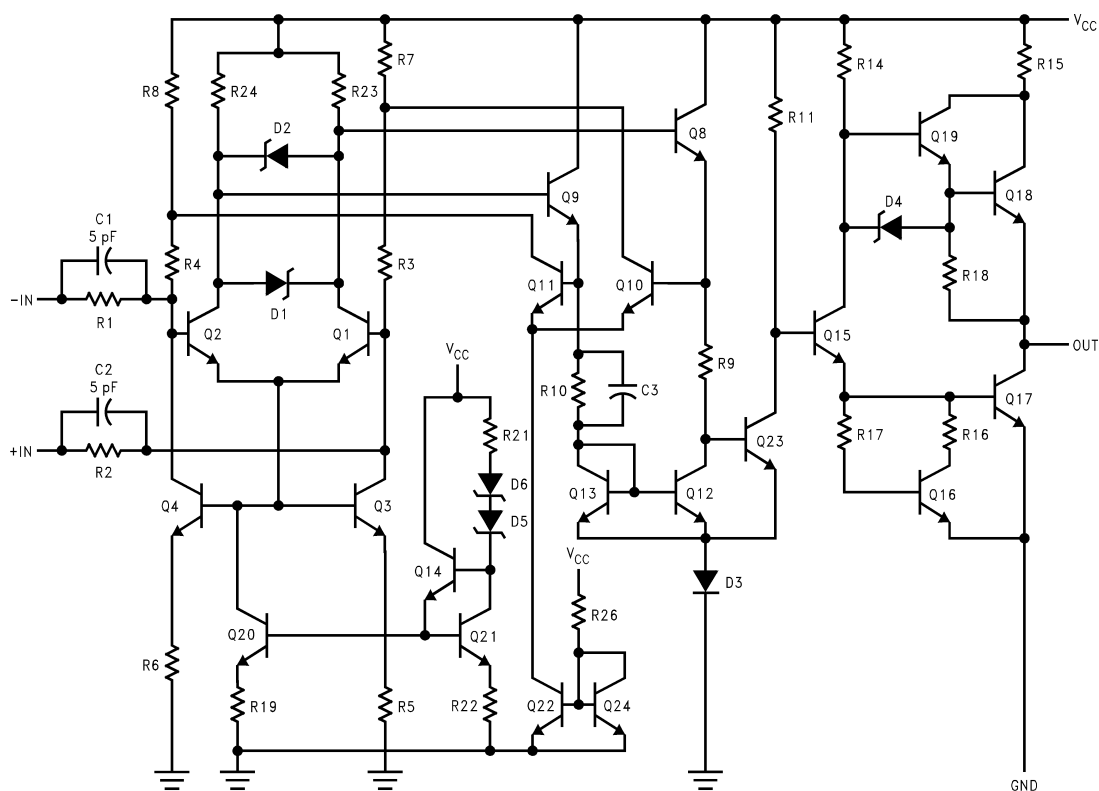
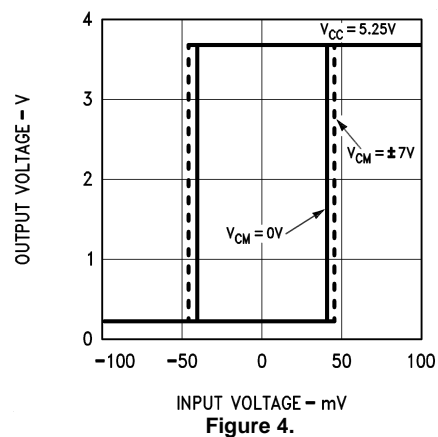
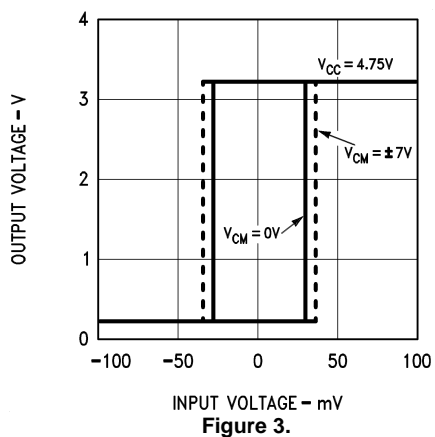
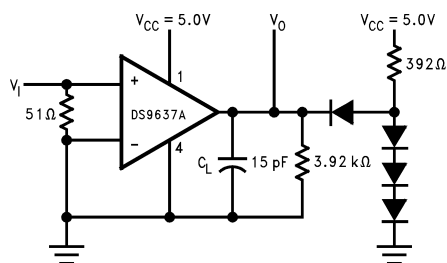


Figure 2. Equivalent Circuit

Typical Input/Output Transfer Characteristics



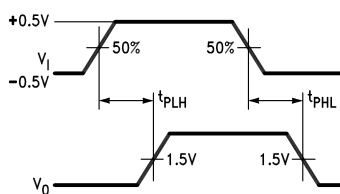
AC TEST CIRCUIT AND WAVEFORMS



Notes:

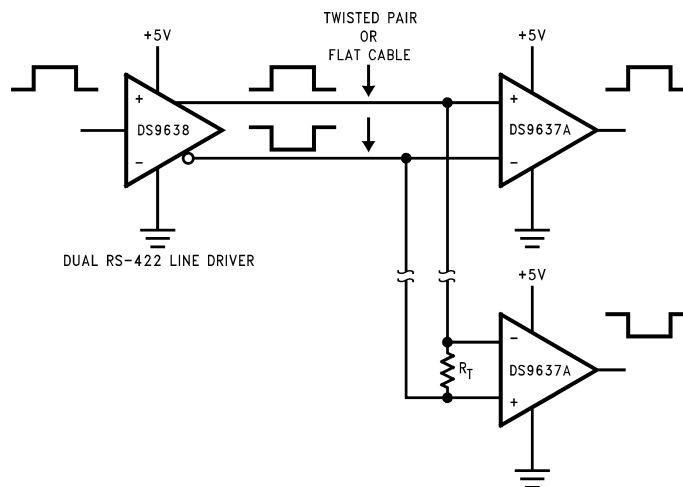
C_L includes jig and probe capacitance.
All diodes are FD700 or equivalent.

Figure 5. AC Test Circuit and Waveforms



V_I
Amplitude: 1.0V
Offset: 0.5V
Pulse Width: 100 ns
PRR: 5.0 MHz
 $t_r = t_f \leq 5.0$ ns

Figure 6. Typical Applications



Notes:

$R_T \geq 50\Omega$ for RS-422 operation.
 R_T combined with input impedance of receivers must be greater than 90 Ω .

Figure 7. RS-422 System Application (FIPS 1020) Differential Simplex Bus Transmission

REVISION HISTORY

Changes from Revision C (April 2013) to Revision D	Page
• Changed layout of National Data Sheet to TI format	5

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
5962-8752401PA	Active	Production	CDIP (NAB) 8	40 TUBE	No	SNPB	Level-1-NA-UNLIM	See DS9637AMJ/883	DS9637AMJ/883 5962-87524 01PA Q ACO 01PA Q >T
DS9637AMJ/883	Active	Production	CDIP (NAB) 8	40 TUBE	No	SNPB	Level-1-NA-UNLIM	-	DS9637AMJ/883 5962-87524 01PA Q ACO 01PA Q >T

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
5962-8752401PA	NAB	CDIP	8	40	506.98	15.24	13440	NA
DS9637AMJ/883	NAB	CDIP	8	40	506.98	15.24	13440	NA

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