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 ±7V either differentially or to ground.

Connection Diagram

Top View

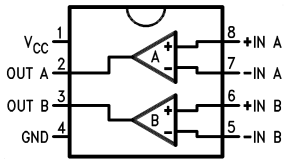

Figure 1. 8-Lead SOIC (D Package)
8-Lead PDIP (P Package)
For Complete Military Product Specifications,
refer to the appropriate SMD or MDS.
8-Lead CDIP (NAB Package)

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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

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

(1) Unless otherwise specified Min/Max limits apply across the −55°C to +125°C temperature range for DS9637AM and across the 0°C to +70°C range for the DS9637ASC. All typicals are given for V_{CC} = 5V and T_A = 25°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) 500Ω ±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°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

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Equivalent Circuit

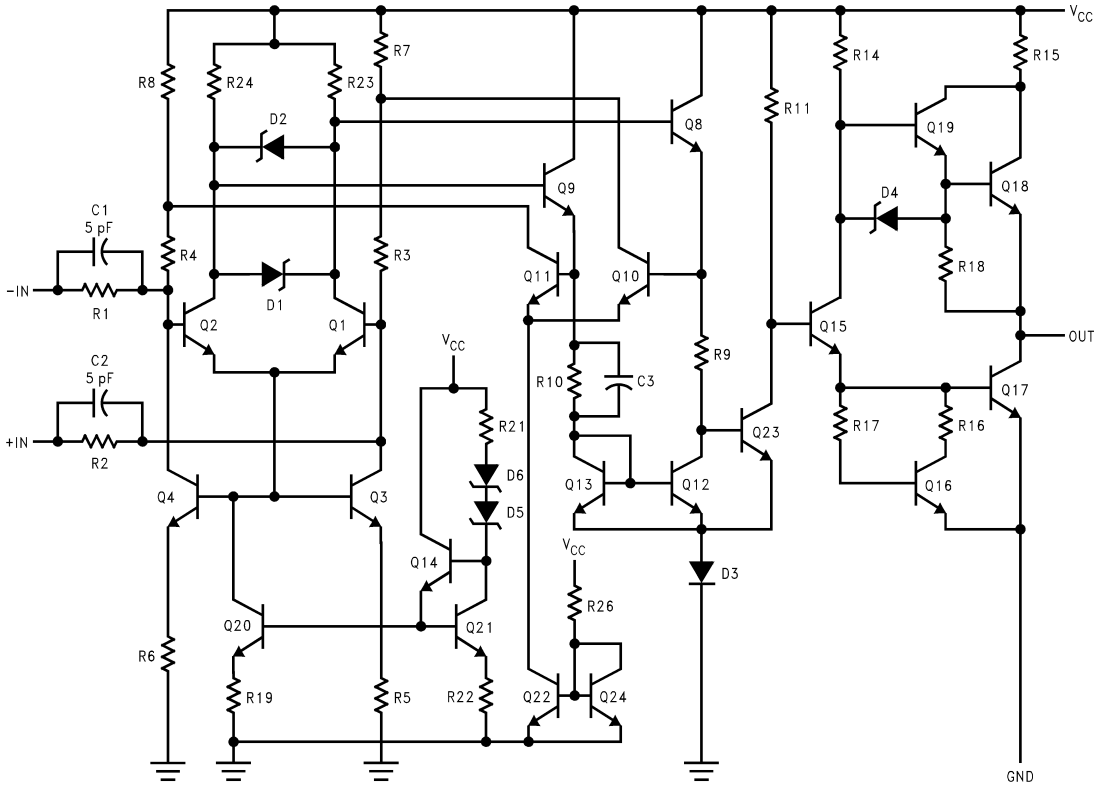

Figure 2. Equivalent Circuit

Typical Input/Output Transfer Characteristics

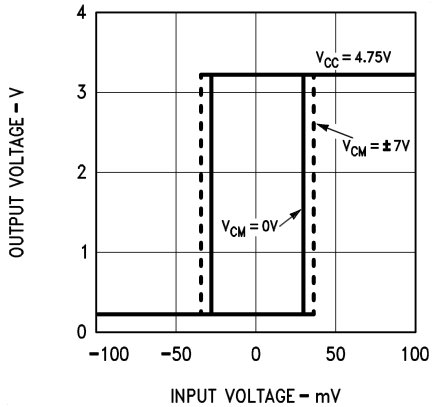

Figure 3.

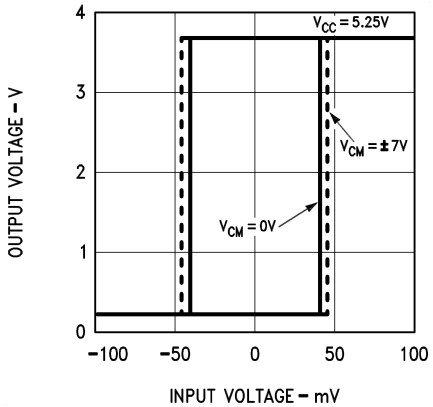

Figure 4.

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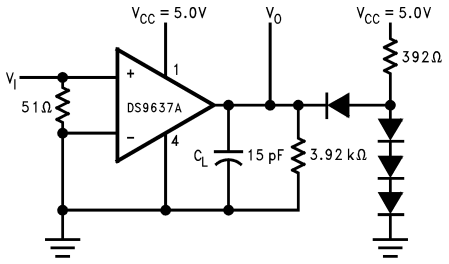
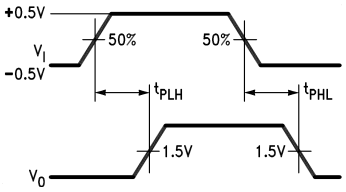
AC TEST CIRCUIT AND WAVEFORMS



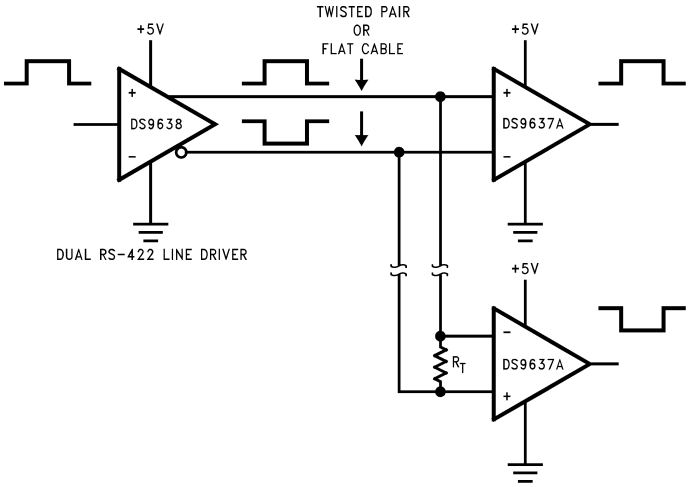
Notes:
C_L includes jig and probe capacitance.
All diodes are FD700 or equivalent.

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 90Ω.

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

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REVISION HISTORY

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

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