National Semiconductor

DS9637A/μA9637A
Dual Differential Line Receiver

General Description

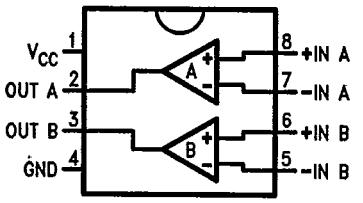
The DS9637A/μA9637A is a Schottky dual differential line receiver which has been specifically designed to satisfy the requirements of EIA Standards RS-422 and RS-423. In addition, the DS9637A/μA9637A satisfies the requirements of MIL-STD 188-114 and is compatible with the International Standard CCITT recommendations. The DS9637A/μA9637A 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/μA9637A has an operational input common mode range of ±7V either differentially or to ground.

Features

- Dual channels
- Single 5V supply
- Satisfies EIA standards RS-422 and RS423
- Built-in ±35 mV hysteresis
- High common mode range
- High input impedance
- TTL compatible output
- Schottky technology
- Extended temperature range

Connection Diagram

8-Lead DIP and SO-8 Package



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Top View

Order Number DS9637ACJ, μA9637ARC, DS9637AMJ, μA9637ARM
See NS Package Number J08A*

Order Number DS9637ACM, μA9637ASC
See NS Package Number M08A

Order Number DS9637ACN, μA9637ATC
See NS Package Number N08E

*For most current package information, contact product marketing.

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Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Storage Temperature Range
- Ceramic DIP: −65°C to + 175°C
- Molded DIP: −65°C to + 150°C

Lead Temperature
- Ceramic DIP (Soldering, 30 seconds): 300°C
- Molded DIP and SO Package (Soldering, 10 seconds): 265°C

Maximum Power Dissipation* at 25°C
- Cavity Package: 1300 mW
- Molded Package: 930 mW
- SO Package: 810 mW

*Derate cavity package 8.7 mW/°C above 25°C; derate molded DIP package 7.5 mW/°C above 25°C; derate SO package 6.5 mW/°C above 25°C.

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

Recommended Operating Conditions

DS9637AM/μA9637AM	Min	Max	Units
Supply Voltage (V_{CC})	4.5	5.5	V
Operating Temperature (T_A)	−55	+125	°C
DS9637AC/μA9637AC			
Supply Voltage (V_{CC})	4.75	5.25	V
Operating Temperature (T_A)	0	+70	°C

Electrical Characteristics

Over recommended operating temperature and supply voltage ranges, unless otherwise specified (Notes 2 and 3)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{TH}	Differential Input Threshold Voltage (Note 5)	$-7.0V \le V_{CM} \le +7.0V$	−0.2		+0.2	V
$V_{TH(R)}$	Differential Input Threshold Voltage (Note 6)	$-7.0V \le V_{CM} \le +7.0V$	−0.4		+0.4	V
I_I	Input Current (Note 7)	$V_I = 10V, 0V \le V_{CC} \le +5.5V$		1.1	3.25	mA
		$V_I = -10V, 0V \le V_{CC} \le +5.5V$	−3.25	−1.6		
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 (Note 4)	V_O = 0V, V_{CC} = Max	−40	−75	−100	mA
I_{CC}	Supply Current	V_{CC} = Max, V_I+ = 0.5V, V_I- = GND		35	50	mA
V_{HYST}	Input Hysteresis	V_{CM} = ±7.0V (See Curves)		70		mV

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. 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.

Note 2: 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.

Note 3: 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.

Note 4: Only one output at a time should be shorted.

Note 5: V_{DIFF} (Differential Input Voltage) = $(V_I+) - (V_I-)$. V_{CM} (Common Mode Input Voltage) = V_I+ or V_I-.

Note 6: 500Ω ±1% in series with inputs.

Note 7: The input not under test is tied to ground.

Switching Characteristics V_{CC} = 5.0V, T_A = 25°C

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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

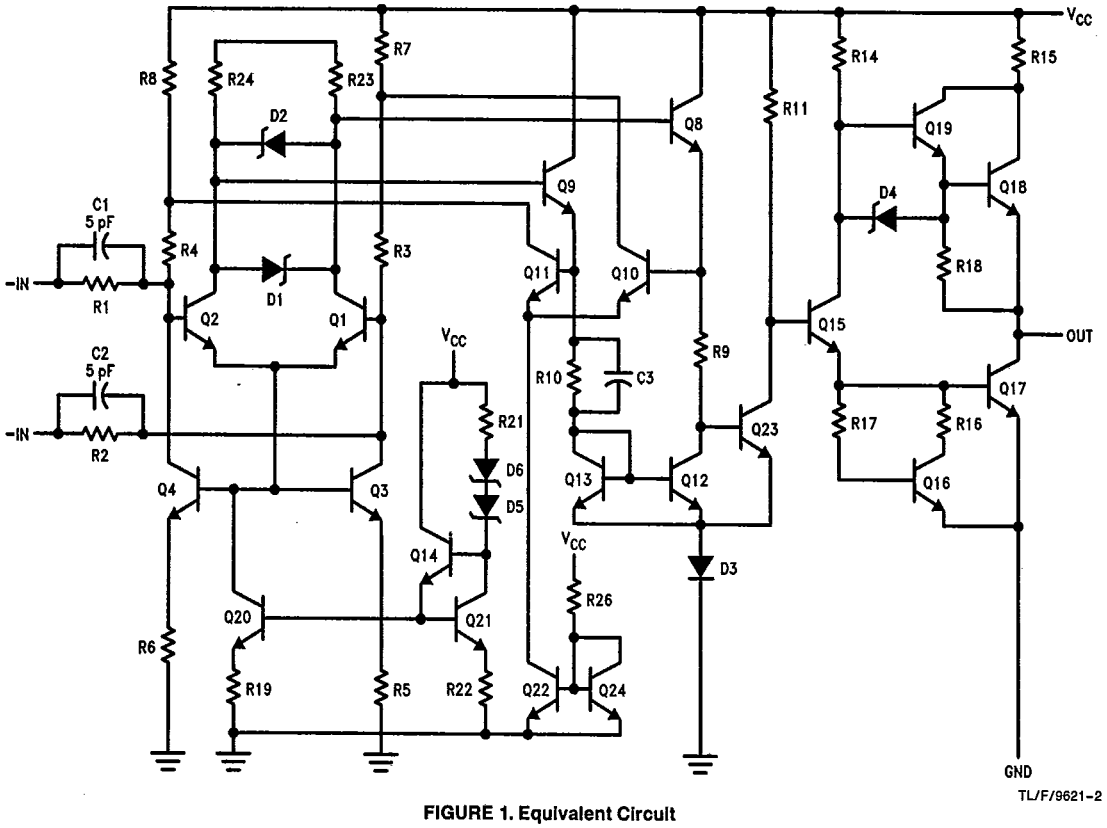

FIGURE 1. Equivalent Circuit

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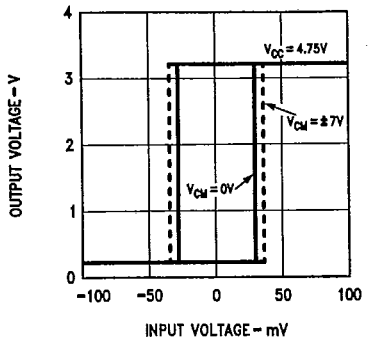
Typical Input/Output Transfer Characteristics



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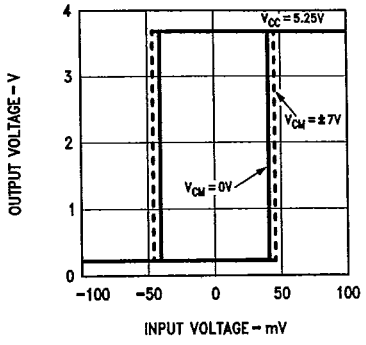

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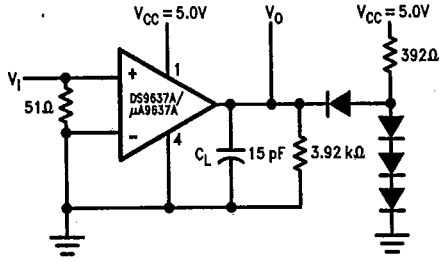
AC Test Circuit and Waveforms



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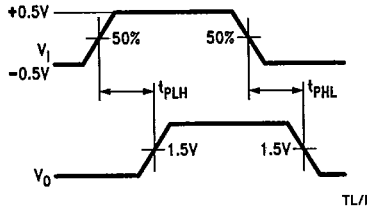
Notes:
C_L includes jig and probe capacitance.
All diodes are FD700 or equivalent.

FIGURE 2



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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 2a

Typical Applications

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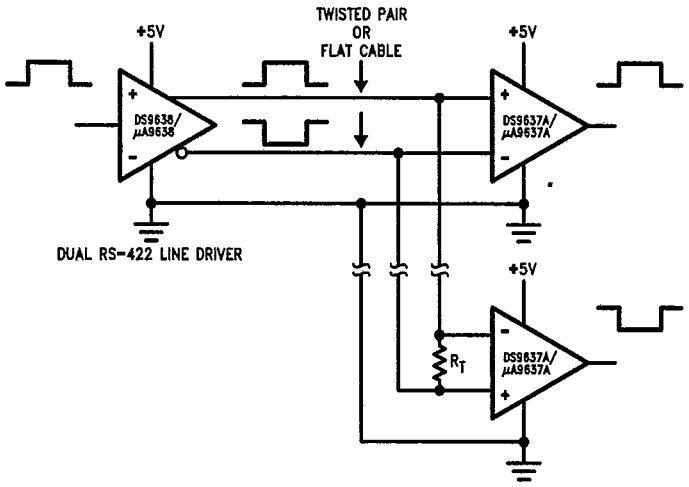

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FIGURE 3. RS-422 System Application (FIPS 1020) Differential Simplex Bus Transmission

Notes:

$R_T \geq 50\Omega$ for RS-422 operation.

R_T combined with input impedance of receivers must be greater than 90Ω.