

DS9637A Dual Differential Line Receiver

General Description

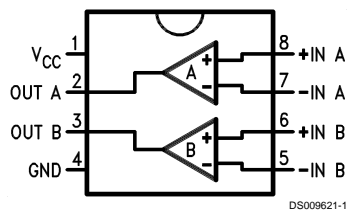
The DS9637A is a Schottky dual differential line receiver which has been specifically designed to satisfy the requirements of EIA Standards RS-422 and RS-423. In addition, the DS9637A satisfies the requirements of MIL-STD 188-114 and is compatible with the International Standard CCITT recommendations. 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.

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

Connection Diagram

8-Lead DIP and SO-8 Package



Top View

Order Number DS9637ACM or DS9637ACN
 See NS Package Number M08A or N08E
 For Complete Military Product Specifications,
 refer to the appropriate SMD or MDS.
 Order Number DS9637AMJ/883
 See NS Package Number J08A

Absolute Maximum Ratings (Note 2)

If Military/Aerospace specified devices are required, please 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 (Note 1) at 25°C | |
| Cavity Package | 1300 mW |
| Molded Package | 930 mW |
| SO Package | 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 |

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 |

Note 1: 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.

Electrical Characteristics (Notes 3, 4)

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|--------------------|---|--|------|------|-------|-------|
| V _{TH} | Differential Input Threshold Voltage (Note 6) | -7.0V ≤ V _{CM} ≤ +7.0V | -0.2 | | +0.2 | V |
| V _{TH(R)} | Differential Input Threshold Voltage (Note 7) | -7.0V ≤ V _{CM} ≤ +7.0V | -0.4 | | +0.4 | V |
| I _I | Input Current (Note 8) | 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 (Note 5) | 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 2: "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 3: 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 4: 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 5: Only one output at a time should be shorted.

Note 6: V_{DIFF} (Differential Input Voltage) = (V_{I+}) - (V_{I-}). V_{CM} (Common Mode Input Voltage) = V_{I+} or V_{I-}.

Note 7: 500Ω ±1% in series with inputs.

Note 8: The input not under test is tied to ground.

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 |

Switching Characteristics (Continued)

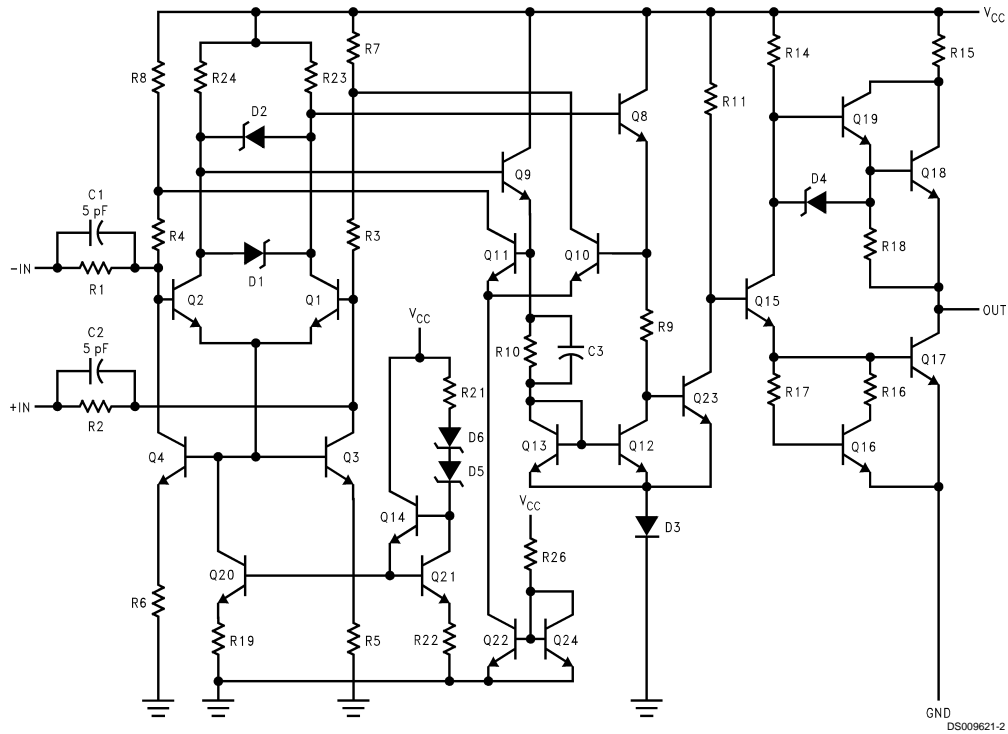
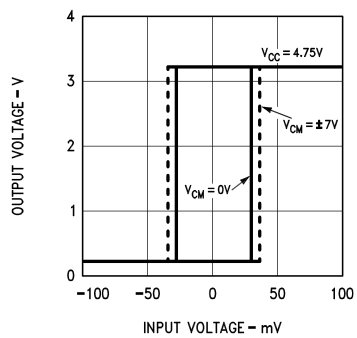
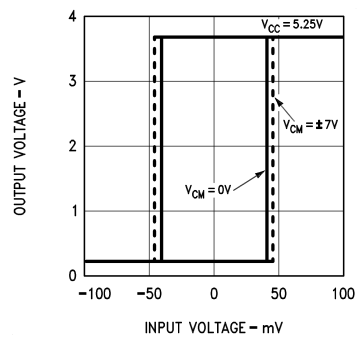


FIGURE 1. Equivalent Circuit

Typical Input/Output Transfer Characteristics

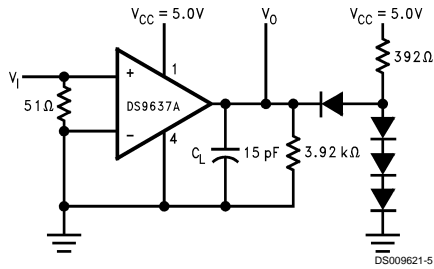


DS009621-3



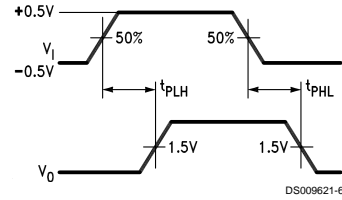
DS009621-4

AC Test Circuit and Waveforms



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

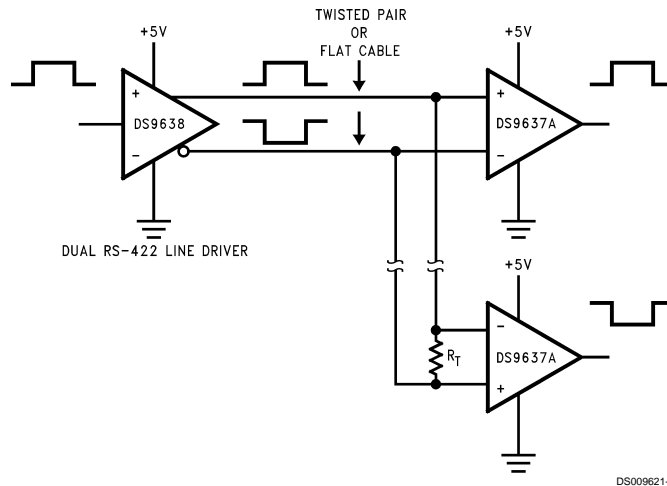
FIGURE 2.



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 3.

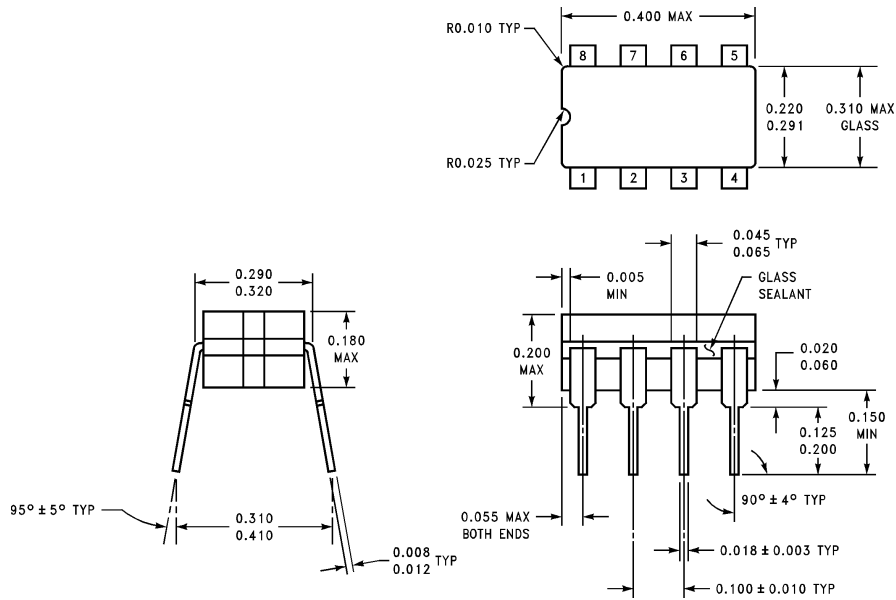
Typical Applications



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

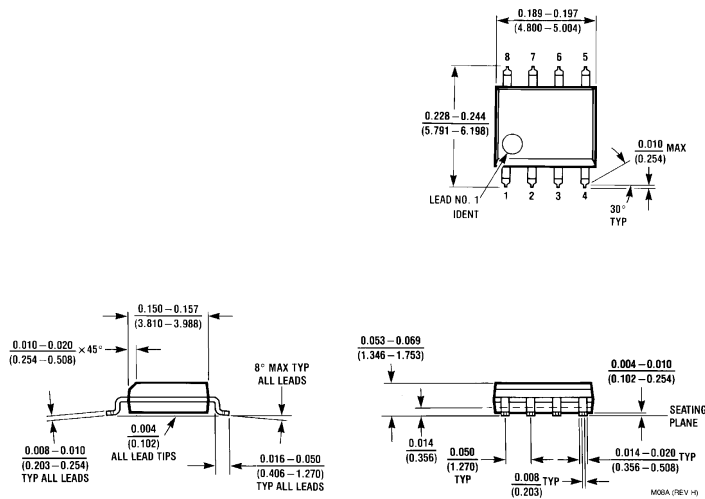
FIGURE 4. RS-422 System Application (FIPS 1020) Differential Simplex Bus Transmission

Physical Dimensions inches (millimeters) unless otherwise noted



Ceramic Dual-In-Line Package (J)
Order Number DS9637AMJ/883
NS Package Number J08A

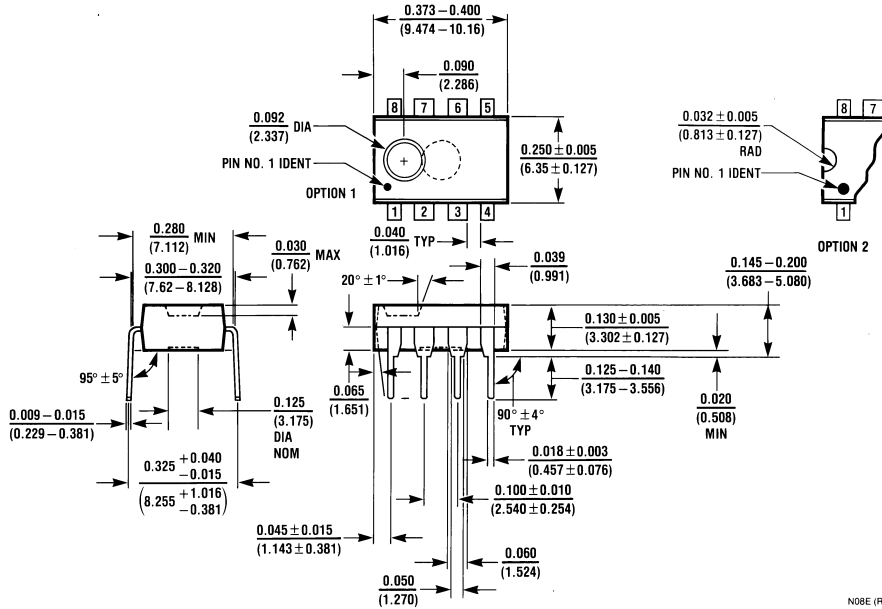
J08A (REV K)



Molded Surface Mount Package (M)
Order Number DS9637ACM
NS Package Number M08A

M08A (REV H)

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)




Molded Dual-In-Line Package (N)
Order Number DS9637ACN
NS Package Number N08E

N08E (REV F)

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