**IN75232N/D**

# EIA-232-D INTERFACE 1 CHIP IC

## Description

The IN75232N, IN75232D are monolithic device containing 3 independent drives and 5 receivers. These are designed to interface between date terminal equipment and date communication equipment as designed by EIA-232-D.

## Features

- Meets standard EIA-232-D (Revision of RS-232-C)
- Designed to Support Data Rate up to 120kbps
- Drivers

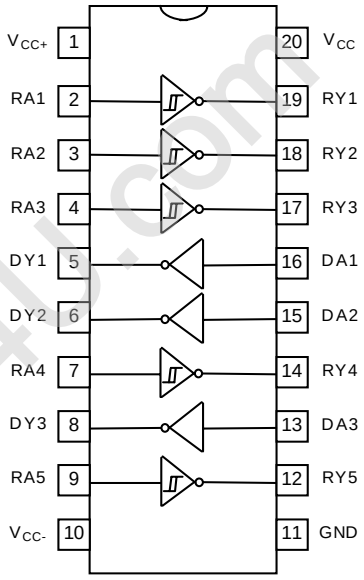
- Current Limited Output 10 mA Typical
- Power-off Output Impedance 300 Ω Min
- Slew Rate Control by Load Capacitor
- Flexible Supply Voltage Range
- Input Compatible with Most TTL and DTL Circuits

- Receivers

- Input Resistance 3 kΩ to 7 kΩ
- Input Signal Range ± 30 V
- Built-in Input Hysteresis (Double Threshold)

- 20 DIP/SO20: MS-001AD (IN75232N) / MS-013AC (IN75232D)

**Block Diagram**




IN75232N, IN75232D

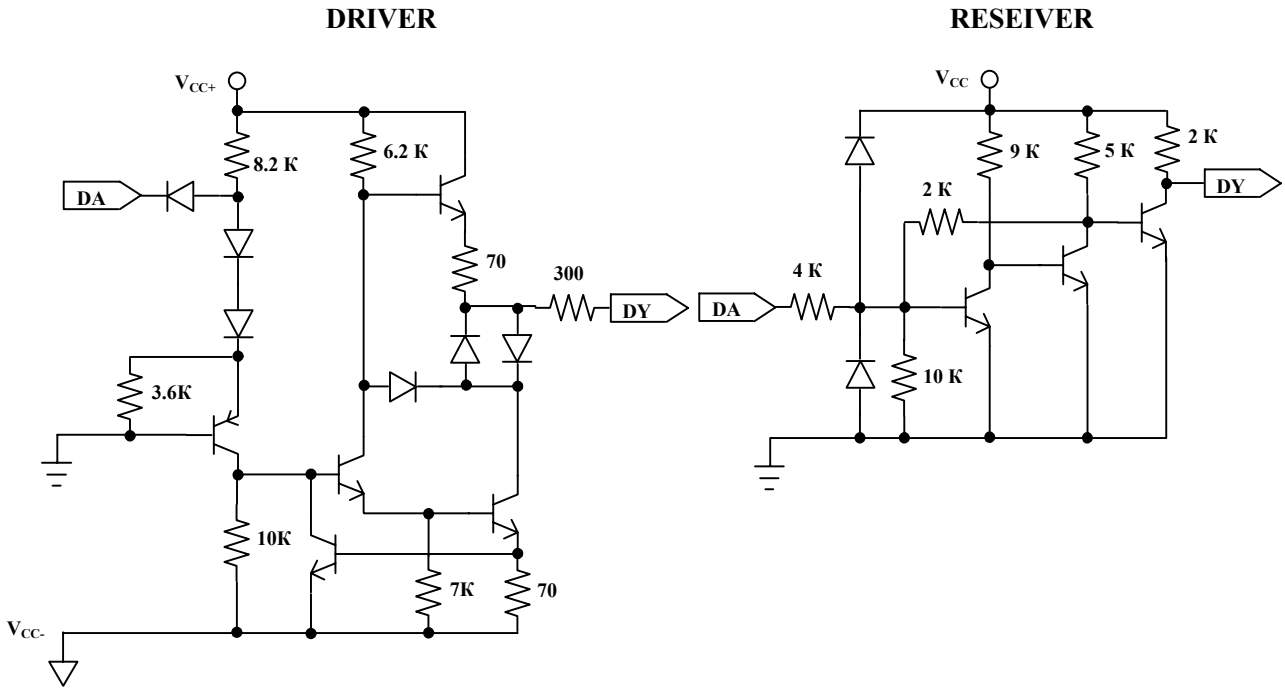
## Pin Description

| Name | Pin No | Function | Name | Pin No | Function |
|---|---|---|---|---|---|
| $V_{CC+}$ | 1 | Driver Section Supply + | $V_{CC-}$ | 10 | Driver Section Supply - |
| DA1 | 16 | | DY1 | 5 | |
| DA2 | 15 | | DY2 | 6 | Driver Output |
| DA3 | 13 | Driver Input | DY3 | 8 | |
| $V_{CC}$ | 20 | Receiver Section Supply | GND | 11 | Ground |
| RA1 | 2 | | RY1 | 19 | |
| RA2 | 3 | | RY2 | 18 | |
| RA3 | 4 | Receiver Input | RY3 | 17 | Receiver Output |
| RA4 | 7 | | RY4 | 14 | |
| RA5 | 9 | | RY5 | 12 | |

## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit |
|---|---|---|---|
| $V_{CC+}$ | Supply Voltage | 15 | V |
| $V_{CC-}$ | Supply Voltage | -15 | V |
| $V_{CC}$ | Supply Voltage | 10 | V |
| VI (Driver) | Input Voltage | -15 ÷ +7 | V |
| VI (Reciver) | Input Voltage | ± 30 | V |
| VO (Driver) | Output Voltage | -15 ÷ +15 | V |
| PT | Continuous Power Dissipation (Below 25 °C) | 1.0 | W |
| $T_{STG}$ | Storage Temperature | -65 ÷ +175 | °C |
| Top | Operating Temperature | 0 ÷ +75 | °C |

## Schematic



## Electrical Characteristics

### Supply Current

$V_{CC}$ = 5V, $T_A$ = 25 $^{O}$C

| Symbol | Parameter | Test Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $I_{CC+}$ | Supply Current | $V_{CC+}$ = 9 V | $V_{IN}$ = 1.9V | | 15 | mA |
| | from $V_{CC+}$ | No Load | $V_{IN}$ = 0.8V | | 4.5 | |
| | | $V_{CC+}$ = 12 V | $V_{IN}$ = 1.9V | | 19 | |
| | | No Load | $V_{IN}$ = 0.8V | | 5.5 | |
| | | $V_{CC+}$ = 15 V | $V_{IN}$ = 1.9V | | 25 | |
| | | No Load | $V_{IN}$ = 0.8V | | 9 | |
| $I_{CC-}$ | Supply Current | $V_{CC-}$ = -9 V | $V_{IN}$ = 1.9V | | -15 | mA |
| | from $V_{CC-}$ | No Load | $V_{IN}$ = 0.8V | | -3.2 | |
| | | $V_{CC-}$ = -12 V | $V_{IN}$ = 1.9V | | -19 | |
| | | No Load | $V_{IN}$ = 0.8V | | -3.2 | |
| | | $V_{CC-}$ = -15 V | $V_{IN}$ = 1.9V | | -25 | |
| | | No Load | $V_{IN}$ = 0.8V | | -3.2 | |
| $I_{CC}$ | Supply Current | $V_{CC}$ = 5 V | $V_{IN}$ = 5.0V | | 30 | mA |
| | from $V_{CC}$ | | | | | |

### Driver Section

| Symbol | Parameter | Test Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{IH}$ | High Level | $V_{CC+}$ = 9 V | | 1.9 | | V |
| | Input Voltage | $V_{CC-}$ = -9 V | | | | |
| $V_{IL}$ | Low Level | | | | 0.8 | V |
| | Input Voltage | | | | | |
| $V_{OH}$ | High Level | $V_{IL}$ = 0.8V | $V_{CC+}$ = 9 V | 6 | | V |
| | Output Voltage | RL = 3 kΩ | $V_{CC-}$ = -9 V | | | |
| | | | $V_{CC+}$ = 13.2 V | 9 | | |
| | | | $V_{CC-}$ = -13.2 V | | | |
| $V_{OL}$ | Low Level | $V_{IH}$ = 1.9V | $V_{CC+}$ = 9 V | | -6 | V |
| | Output Voltage | RL = 3 kΩ | $V_{CC-}$ = -9 V | | | |
| | | | $V_{CC+}$ = 13.2 V | | -9 | |
| | | | $V_{CC-}$ = -13.2 V | | | |
| $I_{IH}$ | High Level | $V_I$ = 5V | | | 10 | μA |
| | Input Current | | | | | |
| $I_{IL}$ | Low Level | $V_I$ = 0 | | | -1.6 | mA |
| | Input Current | | | | | |
| $I_{OS(H)}$ | Short Circuit | $V_I$ = 0.8V | | -6 | -12 | mA |
| | Output Current | $V_O$ = 0 | | | | |
| | at High Level | | | | | |
| $I_{OS(L)}$ | Short Circuit | $V_I$ = 1.9V | | 6 | 12 | mA |
| | Output Current | $V_O$ = 0 | | | | |
| | at Low Level | | | | | |
| $R_O$ | Output Resistance, | $V_{CC+}$ = 0, $V_{CC-}$ = 0 | | 300 | | Ω |
| | Power Off | $V_O$ = -2V to 2V | | | | |

## Driver Switching Characteristic

$V_{CC+}$ = 9V, $V_{CC-}$ = -9V $T_A$ = 25 $^{O}$C

| Symbol | Parameter | Test Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $t_{PLH}$ | Propagation Delay Time, | RL = 3 kΩ | | 500 | ns |
| | Low-To-High-Level Output | CL = 15 µF | | | |
| $t_{PHL}$ | Propagation Delay Time, | | | 175 | ns |
| | High -To- Low -Level Output | See Figure 1 | | | |
| $t_{TLH}$ | Transition Time, | | | 100 | ns |
| | Low-To-High-Level Output * | | | | |
| $t_{THL}$ | Transition Time, | | | 75 | ns |
| | High -To- Low -Level Output* | | | | |
| $t_{TLH}$ | Transition Time, | RL = 3 kΩ to 7 kΩ | 2.5 | | µs |
| | Low-To-High-Level Output** | CL = 2500 ρF | (tip) | | |
| $t_{THL}$ | Transition Time, | | 3.0 | | µs |
| | High-To-Low -Level Output** | See Figure 1 | (tip) | | |

*- Measured between 10 % and 90 % Points of Output Waveform

** - Measured between +3V and -3V Points on the Output Waveform (EIA-232-D Condition)

## Receiver Section

| Symbol | Parameter | Test Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| VT+ | Positive-Going | | 1.75 | 2.25 | V |
| | Threshold Voltage | | | | |
| VT- | Negative-Going | | 0.75 | 1.25 | V |
| | Threshold Voltage | | | | |
| $V_{OH}$ | High Level Output | $V_I$= 0.75V, $I_{OL}$=-0.5mA | 2.6 | 5 | V |
| | Voltage | Input Open, | 2.6 | 5 | |
| | | $I_{OL}$ = -0.5 mA | | | |
| $V_{OL}$ | Low Level Output Voltage | $V_I$= 3V, $I_{OL}$ = 10 mA | | 0.45 | V |
| $I_{IH}$ | High-Level Input Current | $V_I$= 25V | 3.6 | 8.3 | mA |
| | | $V_I$= 3V | 0.43 | | |
| $I_{IL}$ | Low-Level Input Current | $V_I$= -25V | -3.6 | -8.3 | mA |
| | | $V_I$= -3V | -0.43 | | |
| $I_{OS}$ | Short-Circuit | | -3 | | mA |
| | Output Current | | (tip) | | |

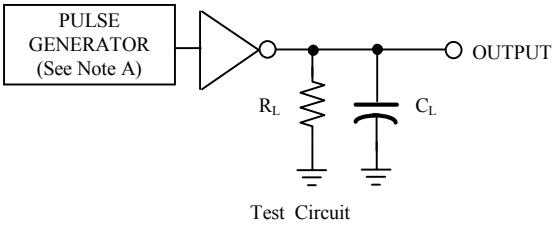
## Receiver Switching Characteristic

$V_{CC}$= 5V

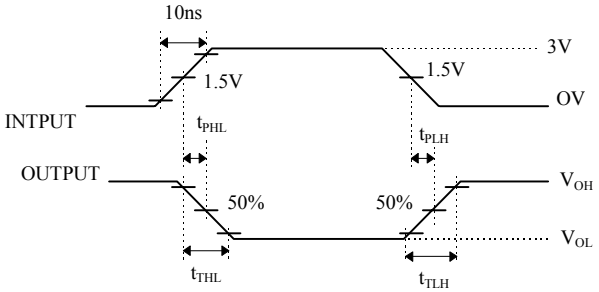
| Symbol | Parameter | Test Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $t_{PLH}$ | Propagation Delay Time, | $C_L$ = 15 ρF | | 150 | ns |
| | Low-To-High-Level Output | $R_L$ = 3.9 kΩ | | | |
| $t_{PHL}$ | Propagation Delay Time, | $C_L$ = 15 ρF | | 50 | ns |
| | High -To- Low -Level Output | $R_L$ = 390 kΩ | | | |
| $t_{TLH}$ | Transition Time, | $C_L$ = 15 ρF | | 175 | ns |
| | Low-To-High-Level Output | $R_L$ = 3.9 kΩ | | | |
| $t_{THL}$ | Transition Time, | $C_L$ = 15 ρF | | 20 | ns |
| | High -To- Low -Level Output | $R_L$ = 390 kΩ | | | |

## Parameter Measurement Information

### DRIVER

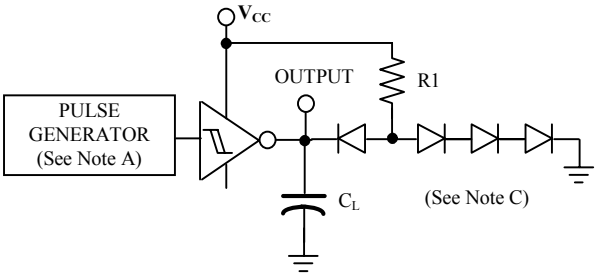



Test Circuit

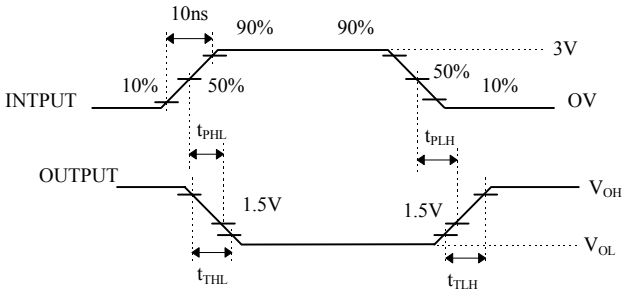



Voltage Waveform

### RESEIVER




Test Circuit

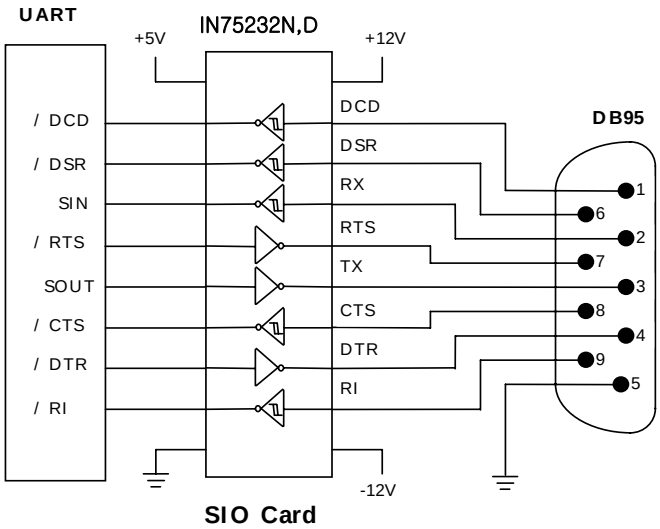



$T_W$=25 μs, Voltage Waveform

Note A. The pulse generator has the following characteristics. f = 200 KHz, $Z_O$ = 50 Ω
B. C included probe and jig capacitance.
C. All diodes are 1N3064 or equivalent.

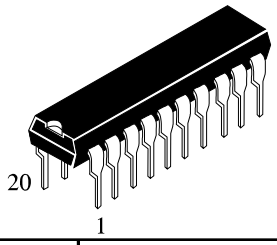
Fig1. Propagation and Transition Times

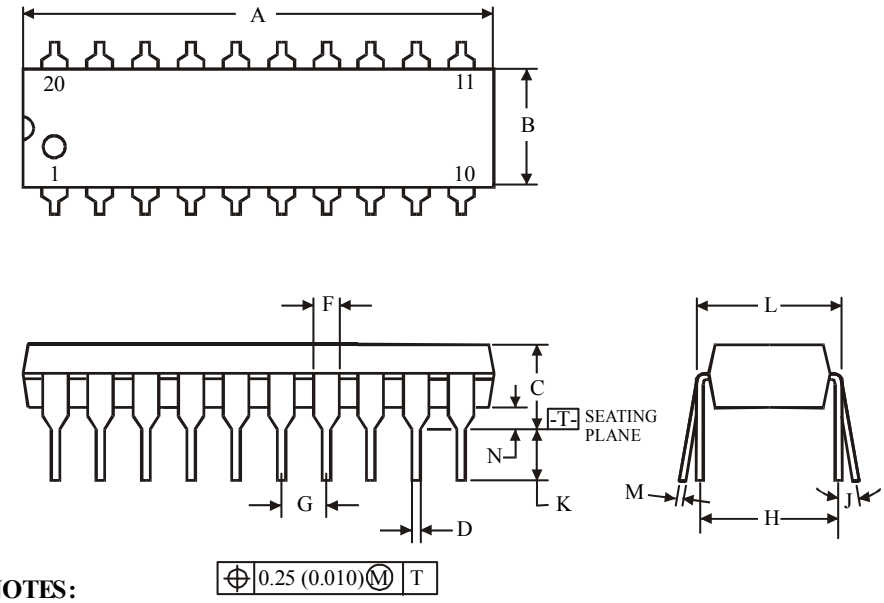
## Typical Application




SIO Card

## N SUFFIX PLASTIC DIP
## (MS - 001AD)



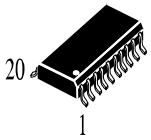

| | Dimension, mm | |
|---|---|---|
| Symbol | MIN | MAX |
| A | 24.89 | 26.92 |
| B | 6.1 | 7.11 |
| C | | 5.33 |
| D | 0.36 | 0.56 |
| F | 1.14 | 1.78 |
| G | 2.54 | |
| H | 7.62 | |
| J | 0° | 10° |
| K | 2.92 | 3.81 |
| L | 7.62 | 8.26 |
| M | 0.2 | 0.36 |
| N | 0.38 | |

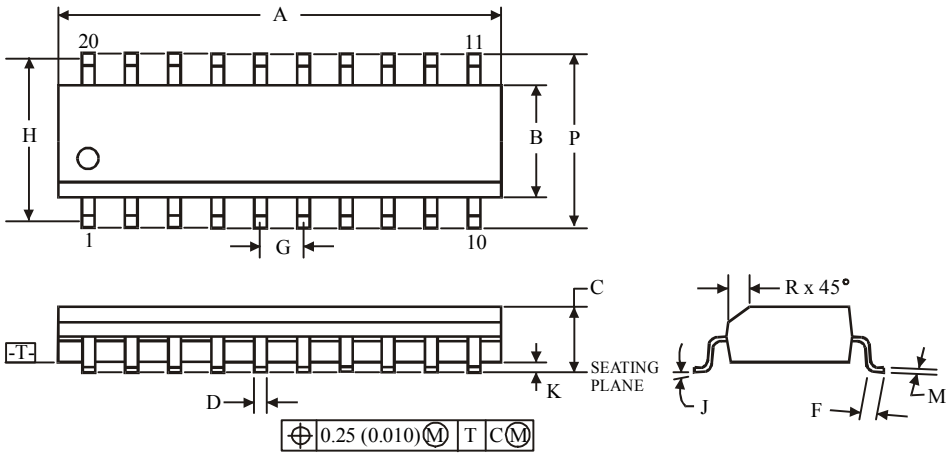
**NOTES:**

1. Dimensions “A”, “B” do not include mold flash or protrusions.

   Maximum mold flash or protrusions 0.25 mm (0.010) per side.

## D SUFFIX SOIC
## (MS - 013AC)




| | Dimension, mm | |
|---|---|---|
| Symbol | MIN | MAX |
| A | 12.6 | 13 |
| B | 7.4 | 7.6 |
| C | 2.35 | 2.65 |
| D | 0.33 | 0.51 |
| F | 0.4 | 1.27 |
| G | 1.27 | |
| H | 9.53 | |
| J | 0° | 8° |
| K | 0.1 | 0.3 |
| M | 0.23 | 0.32 |
| P | 10 | 10.65 |
| R | 0.25 | 0.75 |

**NOTES:**

1. Dimensions A and B do not include mold flash or protrusion.
2. Maximum mold flash or protrusion 0.15 mm (0.006) per side for A; for B – 0.25 mm (0.010) per side.