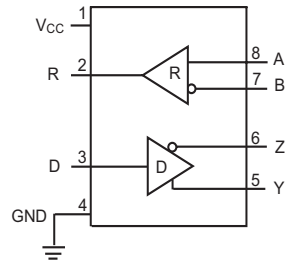


## +3.3V Low Power Full-Duplex RS-485 Transceivers with 10Mbps Data Rate

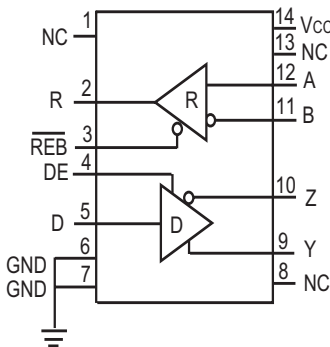
- Full-Duplex RS-485 and RS-422 Transceivers
- Operates from a single +3.3V Supply
- Interoperable with +5.0V logic
- Driver/Receiver Tri-state Enable Lines (**SP3491**)
- -7V to +12V Common-Mode Input Voltage Range
- +/-200mV Receiver Input Sensitivity
- Allows up to 32 transceivers on the serial bus
- Compatability with LTC490 and SN75179 (**SP3490**)
- Compatability with LTC491 and SN75180 (**SP3491**)



**SP3490**

### DESCRIPTION

The **SP3490** and **SP3491** devices are +3.3V low power full-duplex transceivers that meet the specifications of the RS-485 and RS-422 serial protocols. These devices are pin-to-pin compatible with the **Exar** SP490 and SP491 devices as well as popular industry standards. The **SP3490** and **SP3491** feature **Exar's** BiCMOS process, allowing low power operation without sacrificing performance. The **SP3490** and **SP3491** meet the electrical specifications of the RS-485 and RS-422 serial protocols up to 10Mbps under load. The **SP3491** is identical to the **SP3490** with the addition of driver and receiver tri-state enable lines.

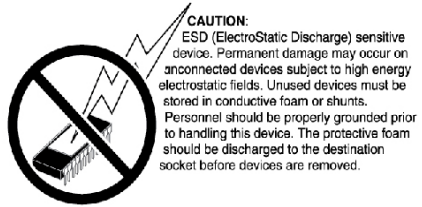


**SP3491**

## ABSOLUTE MAXIMUM RATINGS

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

|                                |                 |
|--------------------------------|-----------------|
| $V_{CC}$ .....                 | +6.0V           |
| Input Voltages                 |                 |
| Logic.....                     | -0.3V to +6.0V  |
| Drivers.....                   | -0.3V to +6.0V  |
| Receivers.....                 | +/-14V          |
| Output Voltages                |                 |
| Drivers.....                   | +/-14V          |
| Receivers.....                 | -0.3V to +6.0V  |
| Storage Temperature.....       | -65°C to +150°C |
| Power Dissipation              |                 |
| 8-pin NSOIC.....               | 600mW           |
| (derate 6.90mW/°C above +70°C) |                 |
| 14-pin NSOIC.....              | 700mW           |
| (derate 8.33mW/°C above +70°C) |                 |



## ELECTRICAL CHARACTERISTICS

$T_{AMB} = T_{MIN}$  to  $T_{MAX}$  and  $V_{CC} = +3.3V \pm 5\%$  unless otherwise noted.

| PARAMETERS                                                                         | MIN. | TYP. | MAX.     | UNITS   | CONDITIONS                                                               |
|------------------------------------------------------------------------------------|------|------|----------|---------|--------------------------------------------------------------------------|
| <b>SP3490 DRIVER</b>                                                               |      |      |          |         |                                                                          |
| <b>DC Characteristics</b>                                                          |      |      |          |         |                                                                          |
| Differential Output Voltage                                                        | GND  |      | $V_{CC}$ | Volts   | Unloaded; $R = \infty \Omega$ ; Figure 1                                 |
| Differential Output Voltage                                                        | 2    |      | $V_{CC}$ | Volts   | With Load; $R = 50 \Omega$ (RS-422); Figure 1                            |
| Differential Output Voltage                                                        | 1.5  |      | $V_{CC}$ | Volts   | With Load; $R = 27 \Omega$ (RS-485); Figure 1                            |
| Change in Magnitude of Driver Differential Output Voltage for Complimentary states |      |      | 0.2      | Volts   | $R = 27 \Omega$ or $R = 50 \Omega$ ; Figure 1                            |
| Driver Common Mode Output Voltage                                                  |      |      | 3        | Volts   | $R = 27 \Omega$ or $R = 50 \Omega$ ; Figure 1                            |
| Input High Voltage                                                                 | 2.0  |      |          | Volts   |                                                                          |
| Input Low Voltage                                                                  |      |      | 0.8      | Volts   |                                                                          |
| Input Current                                                                      |      |      | +/-10    | $\mu A$ |                                                                          |
| Driver Short Circuit Current                                                       |      |      |          |         |                                                                          |
| $V_{OUT} = \text{HIGH}$                                                            |      |      | +/-250   | mA      | $-7V \leq V_O \leq +12V$ ; Figure 8                                      |
| $V_{OUT} = \text{LOW}$                                                             |      |      | +/-250   | mA      | $-7V \leq V_O \leq +12V$ ; Figure 8                                      |
| <b>SP3490 DRIVER</b>                                                               |      |      |          |         |                                                                          |
| <b>AC Characteristics</b>                                                          |      |      |          |         |                                                                          |
| Max. Transmission Rate                                                             | 10   |      |          | Mbps    |                                                                          |
| Driver Input to Output, $t_{PLH}$                                                  | 20   | 40   | 60       | ns      | $R = 27 \Omega$ , Figures 2 & 9                                          |
| Driver Input to Output, $t_{PHL}$                                                  | 20   | 40   | 60       | ns      | $R = 27 \Omega$ , Figures 2 & 9                                          |
| Differential Driver Skew                                                           |      | 2    |          | ns      | $ t_{PHL}(Y) - t_{PLH}(Y) ,  t_{PHL}(Z) - t_{PLH}(Z) $ , Figures 2 and 9 |
| Driver Rise or Fall Time                                                           |      | 5    | 20       | ns      | From 10%-90%; Figures 3 and 10                                           |

## ELECTRICAL CHARACTERISTICS

$T_{AMB} = T_{MIN}$  to  $T_{MAX}$  and  $V_{CC} = +3.3V \pm 5\%$  unless otherwise noted.

| PARAMETERS                                  | MIN.         | TYP. | MAX. | UNITS      | CONDITIONS                                                                |
|---------------------------------------------|--------------|------|------|------------|---------------------------------------------------------------------------|
| <b>SP3490 RECEIVER</b>                      |              |      |      |            |                                                                           |
| <b>DC Characteristics</b>                   |              |      |      |            |                                                                           |
| Differential Input Threshold                | -0.2         |      | +0.2 | Volts      | $-7V \leq V_{CM} \leq +12V$                                               |
| Input Hysteresis                            |              | 25   |      | mV         | $V_{CM} = 0V$                                                             |
| Output Voltage HIGH                         | $V_{CC}-0.4$ |      |      | Volts      | $I_O = -1.5mA, V_{ID} = +200mV$                                           |
| Output Voltage LOW                          |              |      | 0.4  | Volts      | $I_O = +2.5mA, V_{ID} = -200mV$                                           |
| Input Resistance                            | 12           | 15   |      | k $\Omega$ | $-7V \leq V_{CM} \leq +12V$                                               |
| Input Current (A, B); $V_{IN} = 12V$        |              |      | +1.0 | mA         | $V_{IN} = 12V$                                                            |
| Input Current (A, B); $V_{IN} = -7V$        |              |      | -0.8 | mA         | $V_{IN} = -7V$                                                            |
| Short Circuit Current                       |              |      | 60   | mA         | $0V \leq V_O \leq V_{CC}$                                                 |
| <b>SP3490 RECEIVER</b>                      |              |      |      |            |                                                                           |
| <b>AC Characteristics</b>                   |              |      |      |            |                                                                           |
| Max. Transmission Rate                      | 10           |      |      | Mbps       |                                                                           |
| Receiver Input to Output, $t_{PLH}$         | 40           | 70   | 120  | ns         | Figures 6 and 12                                                          |
| Receiver Input to Output, $t_{PLH}$         |              |      | 85   | ns         | $T_{AMB} = +25^\circ C, V_{CC} = 3.3V$ Figures 6 and 12                   |
| Receiver Input to Output, $t_{PHL}$         | 40           | 70   | 120  | ns         | Figures 6 and 12                                                          |
| Receiver Input to Output, $t_{PHL}$         |              |      | 85   | ns         | $T_{AMB} = +25^\circ C, V_{CC} = 3.3V$ Figures 6 and 12                   |
| Differential Receiver Skew                  |              | 4    |      | ns         | $ t_{PHL}(A) - t_{PLH}(A) ,  t_{PHL}(B) - t_{PLH}(B) $ , Figures 6 and 12 |
| <b>POWER REQUIREMENTS</b>                   |              |      |      |            |                                                                           |
| Supply Voltage                              | 3.0          | 3.3  | 3.6  | V          |                                                                           |
| Supply Current                              |              | 1000 | 2000 | $\mu A$    | $D = 0V$ or $V_{CC}$                                                      |
| ESD Protection for D, R, A, B, Y and Z pins |              | +/-2 |      | kV         | Human Body Model                                                          |

# ELECTRICAL CHARACTERISTICS

$T_{AMB} = T_{MIN}$  to  $T_{MAX}$  and  $V_{CC} = +3.3V \pm 5\%$  unless otherwise noted.

| PARAMETERS                                                                         | MIN. | TYP. | MAX.     | UNITS   | CONDITIONS                                                               |
|------------------------------------------------------------------------------------|------|------|----------|---------|--------------------------------------------------------------------------|
| <b>SP3491 DRIVER</b>                                                               |      |      |          |         |                                                                          |
| <b>DC Characteristics</b>                                                          |      |      |          |         |                                                                          |
| Differential Output Voltage                                                        | GND  |      | $V_{CC}$ | Volts   | Unloaded; $R = \infty \Omega$ ; Figure 1                                 |
| Differential Output Voltage                                                        | 2    |      | $V_{CC}$ | Volts   | With Load; $R = 50 \Omega$ (RS-422); Figure 1                            |
| Differential Output Voltage                                                        | 1.5  |      | $V_{CC}$ | Volts   | With Load; $R = 27 \Omega$ (RS-485); Figure 1                            |
| Change in Magnitude of Driver Differential Output Voltage for Complimentary states |      |      | 0.2      | Volts   | $R = 27 \Omega$ or $R = 50 \Omega$ ; Figure 1                            |
| Driver Common Mode Output Voltage                                                  |      |      | 3        | Volts   | $R = 27 \Omega$ or $R = 50 \Omega$ ; Figure 1                            |
| Input High Voltage                                                                 | 2.0  |      |          | Volts   | Applies to DE, D, $\overline{REB}$                                       |
| Input Low Voltage                                                                  |      |      | 0.8      | Volts   | Applies to DE, D, $\overline{REB}$                                       |
| Input Current                                                                      |      |      | +/-10    | $\mu A$ | Applies to DE, D, $\overline{REB}$                                       |
| Driver Short Circuit Current                                                       |      |      |          |         |                                                                          |
| $V_{OUT} = \text{HIGH}$                                                            |      |      | +/-250   | mA      | $-7V \leq V_O \leq +12V$ ; Figure 8                                      |
| $V_{OUT} = \text{LOW}$                                                             |      |      | +/-250   | mA      | $-7V \leq V_O \leq +12V$ ; Figure 8                                      |
| <b>SP3491 DRIVER</b>                                                               |      |      |          |         |                                                                          |
| <b>AC Characteristics</b>                                                          |      |      |          |         |                                                                          |
| Max. Transmission Rate                                                             | 10   |      |          | Mbps    |                                                                          |
| Driver Input to Output, $t_{PLH}$                                                  | 20   | 40   | 60       | ns      | Figures 2 & 9                                                            |
| Driver Input to Output, $t_{PHL}$                                                  | 20   | 40   | 60       | ns      | Figures 2 & 9                                                            |
| Differential Driver Skew                                                           |      | 2    |          | ns      | $ t_{PHL}(Y) - t_{PLH}(Y) ,  t_{PHL}(Z) - t_{PLH}(Z) $ , Figures 2 and 9 |
| Driver Rise or Fall Time                                                           |      | 5    | 20       | ns      | From 10%-90%; Figures 3 and 10                                           |
| Driver Enable to Output HIGH                                                       |      | 52   | 120      | ns      | Figures 4 and 11                                                         |
| Driver Enable to Output LOW                                                        |      | 60   | 120      | ns      | Figures 5 and 11                                                         |
| Driver Disable from LOW                                                            |      | 40   | 120      | ns      | Figures 5 and 11                                                         |
| Driver Disable from HIGH                                                           |      | 60   | 120      | ns      | Figures 4 and 11                                                         |

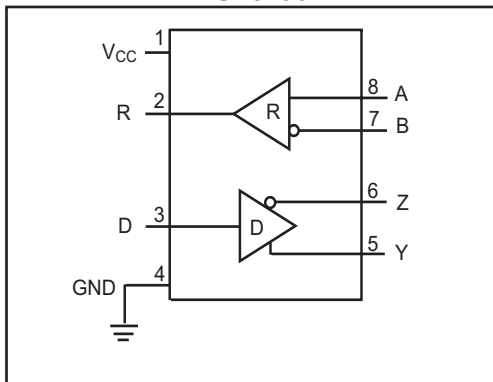
## ELECTRICAL CHARACTERISTICS

$T_{AMB} = T_{MIN}$  to  $T_{MAX}$  and  $V_{CC} = +3.3V \pm 5\%$  unless otherwise noted.

| PARAMETERS                                                         | MIN.         | TYP. | MAX. | UNITS      | CONDITIONS                                                                   |
|--------------------------------------------------------------------|--------------|------|------|------------|------------------------------------------------------------------------------|
| <b>SP3491 RECEIVER</b>                                             |              |      |      |            |                                                                              |
| <b>DC Characteristics</b>                                          |              |      |      |            |                                                                              |
| Differential Input Threshold                                       | -0.2         |      | +0.2 | Volts      | $-7V \leq V_{CM} \leq +12V$                                                  |
| Input Hysteresis                                                   |              | 25   |      | mV         | $V_{CM} = 0V$                                                                |
| Output Voltage HIGH                                                | $V_{CC}-0.4$ |      |      | Volts      | $I_O = -1.5mA$ , $V_{ID} = +200mV$                                           |
| Output Voltage LOW                                                 |              |      | 0.4  | Volts      | $I_O = +2.5mA$ , $V_{ID} = -200mV$                                           |
| Three-State ( High Impedance) Output Current                       |              |      | +/-1 | $\mu A$    | $0V \leq V_O \leq V_{CC}$ ; $\overline{REB} = V_{CC}$                        |
| Input Resistance                                                   | 12           | 15   |      | k $\Omega$ | $-7V \leq V_{CM} \leq +12V$                                                  |
| Input Current (A, B); $V_{IN} = 12V$                               |              |      | +1.0 | mA         | $DE = 0V$ , $V_{CC} = 0V$ or 3.6V, $V_{IN} = 12V$                            |
| Input Current (A, B); $V_{IN} = -7V$                               |              |      | -0.8 | mA         | $DE = 0V$ , $V_{CC} = 0V$ or 3.6V, $V_{IN} = -7V$                            |
| Short Circuit Current                                              |              |      | 60   | mA         | $0V \leq V_O \leq V_{CC}$                                                    |
| <b>SP3491 RECEIVER</b>                                             |              |      |      |            |                                                                              |
| <b>AC Characteristics</b>                                          |              |      |      |            |                                                                              |
| Max. Transmission Rate                                             | 10           |      |      | Mbps       | $\overline{REB} = 0V$ , $DE = 0V$                                            |
| Receiver Input to Output, $t_{PLH}$                                | 40           | 70   | 120  | ns         | Figures 6 and 12                                                             |
| Receiver Input to Output, $t_{PLH}$                                |              |      | 85   | ns         | $T_{AMB} = +25^\circ C$ , $V_{CC} = 3.3V$ , Figures 6 and 12                 |
| Receiver Input to Output, $t_{PHL}$                                | 40           | 70   | 120  | ns         | Figures 6 and 12                                                             |
| Receiver Input to Output, $t_{PHL}$                                |              |      | 85   | ns         | $T_{AMB} = +25^\circ C$ , $V_{CC} = 3.3V$ , Figures 6 and 12                 |
| Differential Receiver Skew                                         |              | 4    |      | ns         | $ t_{PHL}(A) - t_{PLH}(A) $ , $ t_{PHL}(B) - t_{PLH}(B) $ , Figures 6 and 12 |
| Receiver Enable to Output LOW                                      |              | 65   | 150  | ns         | Figures 7 and 13; $S_1$ Closed, $S_2$ open                                   |
| Receiver Enable to Output HIGH                                     |              | 65   | 150  | ns         | Figures 7 and 13; $S_2$ Closed, $S_1$ open                                   |
| Receiver Disable from LOW                                          |              | 65   | 200  | ns         | Figures 7 and 13; $S_1$ Closed, $S_2$ open                                   |
| Receiver Disable from HIGH                                         |              | 65   | 200  | ns         | Figures 7 and 13; $S_2$ Closed, $S_1$ open                                   |
| <b>POWER REQUIREMENTS</b>                                          |              |      |      |            |                                                                              |
| Supply Voltage                                                     | +3.0         |      | +3.6 | V          |                                                                              |
| Supply Current                                                     |              | 1000 | 2000 | $\mu A$    | $\overline{REB}$ , $D = 0V$ or $V_{CC}$ ; $DE = V_{CC}$                      |
| Supply Current                                                     |              | 800  | 1500 | $\mu A$    | $DE = 0V$                                                                    |
| ESD Protection for R, D, DE, $\overline{REB}$ , A, B, Y and Z pins |              | +/-2 |      | kV         | Human Body Model                                                             |

## PIN FUNCTION

### SP3490



### Pin Function SP3490

Pin 1 - Vcc - Positive supply  $+3.00V < V_{cc} < +3.60V$

Pin 2 - R - Receiver output

Pin 3 - D - Driver input

Pin 4 - GND - Ground connection

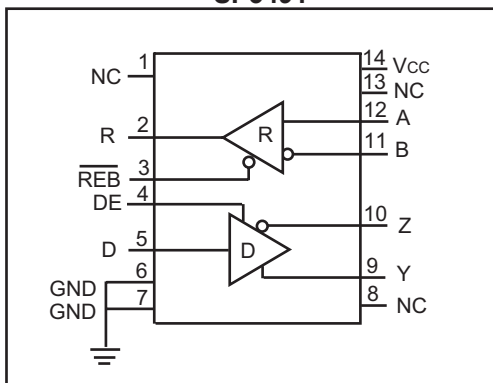
Pin 5 - Y - Non-inverting driver output

Pin 6 - Z - Inverting driver output

Pin 7 - B - Inverting receiver Input

Pin 8 - A - Non-inverting receiver input

### SP3491



### Pin Function SP3491

Pin 1 - NC - No connect

Pin 2 - R - Receiver output

Pin 3 -  $\overline{REB}$  - Receiver output enable active LOW

Pin 4 - DE - Driver output enable active HIGH

Pin 5 - D - Driver input

Pin 6 - GND - Ground connection

Pin 7 - GND - Ground connection

Pin 8 - NC - No connect

Pin 9 - Y - Non-inverting driver output

Pin 10 - Z - Inverting driver output

Pin 11 - B - Inverting receiver Input

Pin 12 - A - Non-Inverting receiver input

Pin 13 - NC - No connect

Pin 14 - Vcc - Positive supply  $+3.00V < V_{cc} < +3.60V$

## TEST CIRCUITS

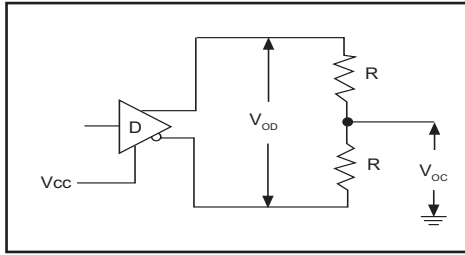


Figure 1. Driver DC Test Load Circuit

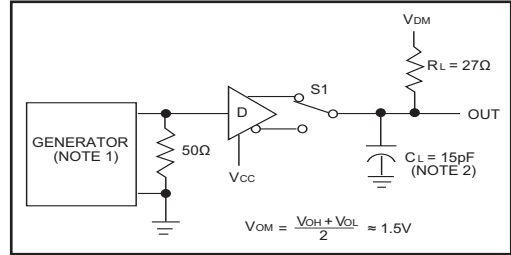


Figure 2. Driver Propagation Delay Test Circuit

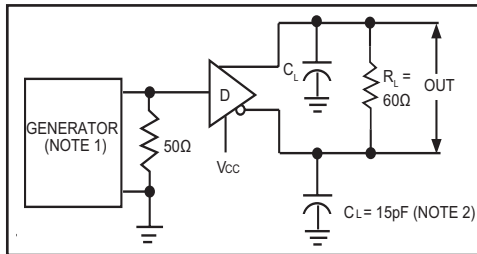


Figure 3. Driver Differential Output Delay and Transition Time Circuit.

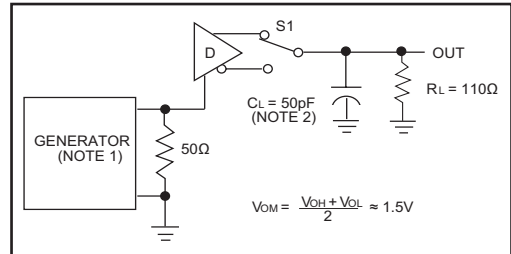


Figure 4. Driver Enable and Disable Timing Circuit, Output High

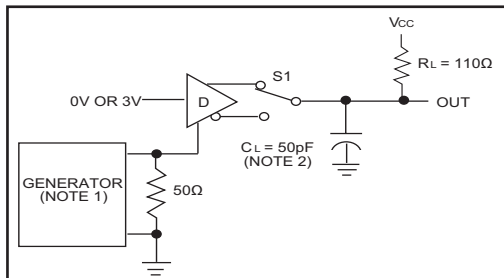


Figure 5. Driver Enable and Disable Timing Circuit, Output Low

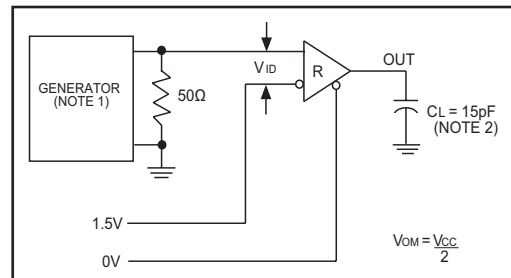


Figure 6. Receiver Propagation Delay Test Circuit

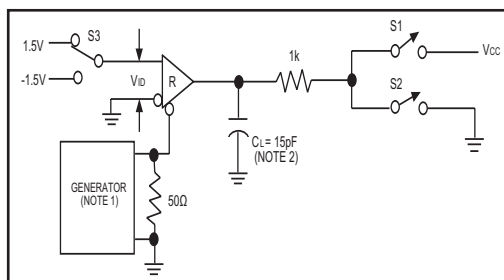


Figure 7. Receiver Enable and Disable Timing Circuit

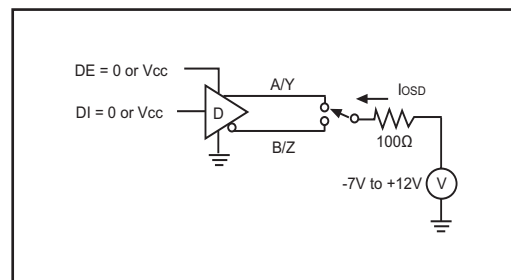


Figure 8. Driver Short Circuit Current Limit Test

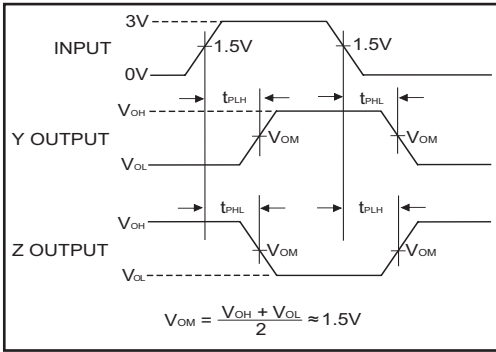


Figure 9. Driver Propagation Delay Waveforms

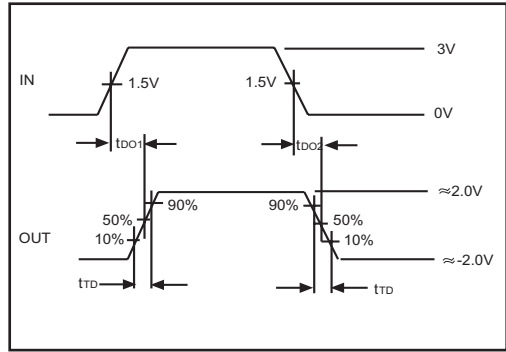


Figure 10. Driver Differential Output Delay and Transition Time Waveforms

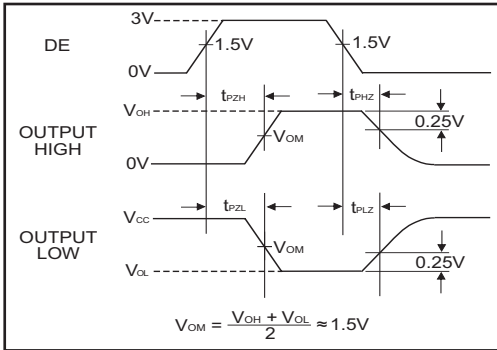


Figure 11. Driver Enable and Disable Timing Waveforms

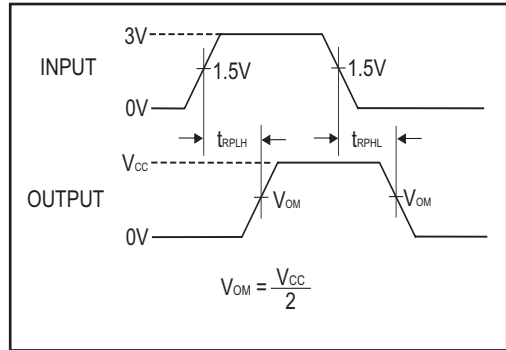


Figure 12. Receiver Propagation Delay Waveforms

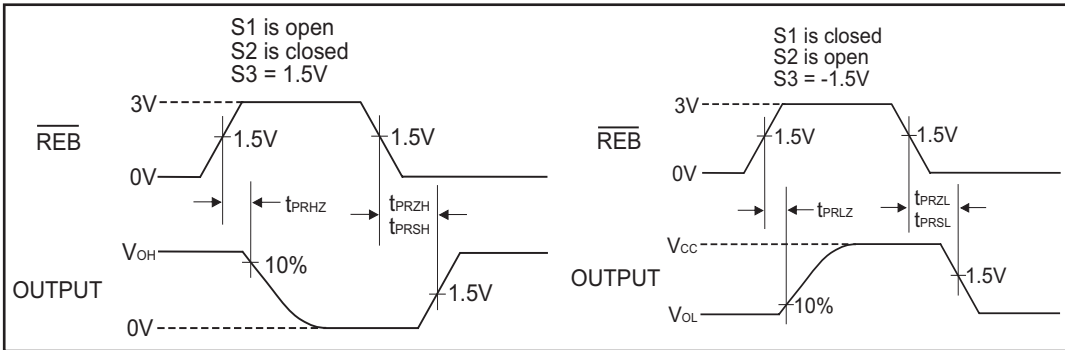


Figure 13. Receiver Enable and Disable Waveforms

NOTE 1: The input pulse is supplied by a generator with the following characteristics:

PRR = 250kHz, 50% duty cycle,  $t_r < 6.0ns$ ,  $Z_o = 50\Omega$ .

NOTE 2:  $C_L$  includes probe and stray capacitance.

The **SP3490** and **SP3491** are two members in the family of +3.3V low power full-duplex transceivers that meet the electrical specifications of the RS-485 and RS-422 serial protocols. These devices are pin-to-pin compatible with the **Exar** SP490 and SP491 devices as well as popular industry standards. The **SP3490** and **SP3491** feature **Exar's** BiCMOS process allowing low power operation without sacrificing performance.

The RS-485 standard is ideal for multi-drop applications and for long-distance interfaces. RS-485 allows up to 32 drivers and 32 receivers to be connected to a data bus, making it an ideal choice for multi-drop applications. Since the cabling can be as long as 4,000 feet, RS-485 transceivers are equipped with a wide (-7V to +12V) common mode range to accommodate ground potential differences. Because RS-485 is a differential interface, data is virtually immune to noise in the transmission line.

## Drivers

The drivers for both the **SP3490** and **SP3491** have differential outputs. The typical voltage output swing with no load will be 0 volts to V<sub>CC</sub>. With worst case loading of 54Ω across the differential outputs, the drivers can maintain greater than 1.5V voltage levels.

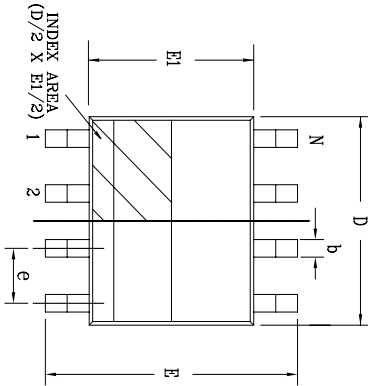
The driver of the **SP3491** has a driver enable control line which is active HIGH. A logic HIGH on DE (pin 4) of the **SP3491** will enable the differential driver outputs. A logic LOW on the DE(pin 4) will tri-state the driver outputs. The **SP3490** does not have a driver enable.

## Receivers

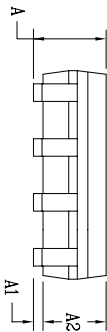
The receivers of the **SP3490** and **SP3491** have differential inputs with an input sensitivity of ±200mV. Input impedance of the receivers is typically 15kΩ (12kΩ minimum). A wide common mode range of -7V to +12V allows for large ground potential differences between systems. The receivers for both the **SP3490** and **SP3491** are equipped with a fail-safe feature that guarantees the receiver output will be in a HIGH state when the input is left unconnected.

The receiver of the **SP3491** has a enable control line which is active LOW. A logic LOW on REB (pin 3) of the **SP3491** will enable the differential receiver. A logic HIGH on REB (pin 3) of the **SP3491** will tri-state the receiver.

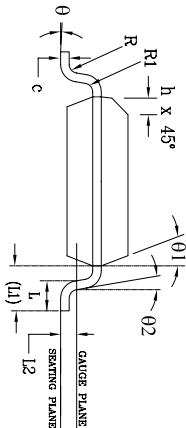
| REVISION HISTORY |                                      |          |       |  |
|------------------|--------------------------------------|----------|-------|--|
| REV.             | DESCRIPTION                          | DATE     | APP'D |  |
| A                | DRAWING ORIGINATOR                   | 08/16/05 | JL    |  |
| B                | DRAWING FORMAT MODIFICATION          | 07/19/06 | JL    |  |
| C                | CHANGE DRAWING LOGO AND COMPANY NAME | 11/16/07 | JL    |  |



Top View



Side View

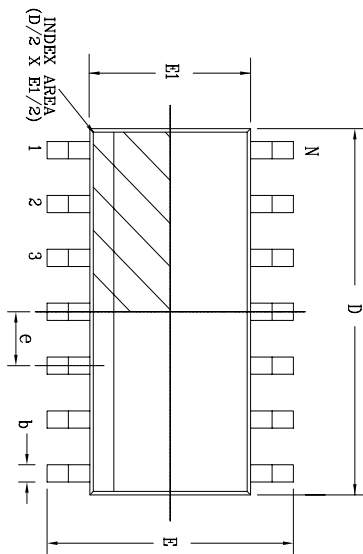


Front View

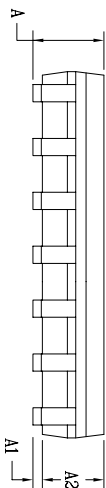
| 8 Pin SOICN |          | JEDEC MS-012                       |      | Variation AA |                                        |       |     |
|-------------|----------|------------------------------------|------|--------------|----------------------------------------|-------|-----|
| SYMBOLS     |          | DIMENSIONS IN MM<br>(Control Unit) |      |              | DIMENSIONS IN INCH<br>(Reference Unit) |       |     |
|             |          | MIN                                | NOM  | MAX          | MIN                                    | NOM   | MAX |
| A           | 1.35     | —                                  | 1.75 | 0.053        | —                                      | 0.069 | —   |
| A1          | 0.10     | —                                  | 0.25 | 0.004        | —                                      | 0.010 | —   |
| A2          | 1.25     | —                                  | 1.65 | 0.049        | —                                      | 0.065 | —   |
| b           | 0.31     | —                                  | 0.51 | 0.012        | —                                      | 0.020 | —   |
| c           | 0.17     | —                                  | 0.25 | 0.007        | —                                      | 0.010 | —   |
| E           | 6.00 BSC |                                    |      |              | 0.236 BSC                              |       |     |
| E1          | 3.90 BSC |                                    |      |              | 0.154 BSC                              |       |     |
| e           | 1.27 BSC |                                    |      |              | 0.050 BSC                              |       |     |
| h           | 0.25     | —                                  | 0.50 | 0.010        | —                                      | 0.020 | —   |
| L           | 0.40     | —                                  | 1.27 | 0.016        | —                                      | 0.050 | —   |
| L1          | 1.04 REF |                                    |      |              | 0.041 REF                              |       |     |
| L2          | 0.25 BSC |                                    |      |              | 0.010 BSC                              |       |     |
| R           | 0.07     | —                                  |      |              | 0.003                                  | —     |     |
| R1          | 0.07     | —                                  |      |              | 0.003                                  | —     |     |
| θ           | 0°       | —                                  | 8°   | 0°           | —                                      | 8°    | —   |
| θ1          | 5°       | —                                  | 15°  | 5°           | —                                      | 15°   | —   |
| θ2          | 0°       | —                                  |      |              | 0°                                     | —     |     |
| D           | 4.90 BSC |                                    |      |              | 0.193 BSC                              |       |     |
| N           | 8        |                                    |      |              | 8                                      |       |     |

|                                                                                     |                |                             |             |
|-------------------------------------------------------------------------------------|----------------|-----------------------------|-------------|
|  |                | EXAR CORPORATION            |             |
| Packaging Approval:                                                                 |                | 8 PIN SOICN PACKAGE OUTLINE |             |
| By: JL                                                                              | Date: 11/16/07 | Drawing No: 8-PIN SOICN     | Revision: C |
|                                                                                     |                | Sheet: 1 OF 1               |             |

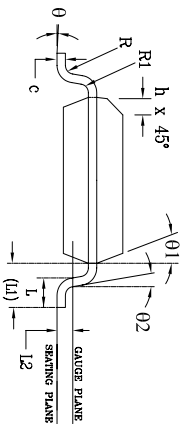
| REVISION HISTORY |                                      |          |       |
|------------------|--------------------------------------|----------|-------|
| REV.             | DESCRIPTION                          | DATE     | APP'D |
| A                | DRAWING ORIGINATOR                   | 04/17/06 | JL    |
| B                | CHANGE DRAWING LOGO AND COMPANY NAME | 11/21/07 | JL    |



Top View



Side View



Front View

| 14 Pin SOICN JEDEC MS-012 Variation AB |                                    |     |      |                                        |     |       |
|----------------------------------------|------------------------------------|-----|------|----------------------------------------|-----|-------|
| SYMBOLS                                | DIMENSIONS IN MM<br>(Control Unit) |     |      | DIMENSIONS IN INCH<br>(Reference Unit) |     |       |
|                                        | MIN                                | NOM | MAX  | MIN                                    | NOM | MAX   |
| A                                      | 1.35                               | —   | 1.75 | 0.053                                  | —   | 0.069 |
| A1                                     | 0.10                               | —   | 0.25 | 0.004                                  | —   | 0.010 |
| A2                                     | 1.25                               | —   | 1.65 | 0.049                                  | —   | 0.065 |
| b                                      | 0.31                               | —   | 0.51 | 0.012                                  | —   | 0.020 |
| c                                      | 0.17                               | —   | 0.25 | 0.007                                  | —   | 0.010 |
| E                                      | 6.00 BSC                           |     |      | 0.236 BSC                              |     |       |
| E1                                     | 3.90 BSC                           |     |      | 0.154 BSC                              |     |       |
| e                                      | 1.27 BSC                           |     |      | 0.050 BSC                              |     |       |
| h                                      | 0.25                               | —   | 0.50 | 0.010                                  | —   | 0.020 |
| L                                      | 0.40                               | —   | 1.27 | 0.016                                  | —   | 0.050 |
| L1                                     | 1.04 REF                           |     |      | 0.041 REF                              |     |       |
| L2                                     | 0.25 BSC                           |     |      | 0.010 BSC                              |     |       |
| R                                      | 0.07                               | —   | —    | 0.003                                  | —   | —     |
| R1                                     | 0.07                               | —   | —    | 0.003                                  | —   | —     |
| θ                                      | 0°                                 | —   | 8°   | 0°                                     | —   | 8°    |
| θ1                                     | 5°                                 | —   | 15°  | 5°                                     | —   | 15°   |
| θ2                                     | 0°                                 | —   | —    | 0°                                     | —   | —     |
| D                                      | 8.65 BSC                           |     |      | 0.341 BSC                              |     |       |
| N                                      | 14                                 |     |      | 14                                     |     |       |

|                                                                                     |                |                          |                           |
|-------------------------------------------------------------------------------------|----------------|--------------------------|---------------------------|
|  |                |                          |                           |
| <b>EXAR CORPORATION</b>                                                             |                |                          |                           |
| Packaging Approval: 14 PIN SOICN PACKAGE OUTLINE                                    |                |                          |                           |
| By: JL                                                                              | Date: 11/21/07 | Drawing No: 14-PIN SOICN | Revision: B Sheet: 1 OF 1 |

## ORDERING INFORMATION

| Model               | Temperature Range    | Package Types |
|---------------------|----------------------|---------------|
| SP3490CN-L .....    | 0°C to +70°C .....   | 8-pin NSOIC   |
| SP3490CN-L/TR ..... | 0°C to +70°C .....   | 8-pin NSOIC   |
| SP3490EN-L .....    | -40°C to +85°C ..... | 8-pin NSOIC   |
| SP3490EN-L/TR ..... | -40°C to +85°C ..... | 8-pin NSOIC   |
| SP3491CN-L .....    | 0°C to +70°C .....   | 14-pin NSOIC  |
| SP3491CN-L/TR ..... | 0°C to +70°C .....   | 14-pin NSOIC  |
| SP3491EN-L .....    | -40°C to +85°C ..... | 14-pin NSOIC  |
| SP3491EN-L/TR ..... | -40°C to +85°C ..... | 14-pin NSOIC  |

Note: /TR = Tape and Reel

## REVISION HISTORY

| DATE     | REVISION | DESCRIPTION                                                                                                                                                                                                               |
|----------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10/11/02 | --       | Legacy Sipex Datasheet                                                                                                                                                                                                    |
| 06/08/10 | 1.0.0    | Convert to Exar Format. Update ordering information as a result of discontinued Lead type package options per PDN 081126-01. Change revision to 1.0.0. Add new Figure 8 - Driver Short Circuit Current Limit Test Circuit |
| 9/14/10  | 1.0.1    | Correct package type for SP3491 options in ordering table from 8 pin NSOIC to 14 pin NSOIC                                                                                                                                |
| 10/27/10 | 1.0.2    | Add ESD protection levels of +/-2kV. Remove SP3490 Supply Current rating for DE = 0V (No driver enable for SP3490).                                                                                                       |

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Datasheet October 2010

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