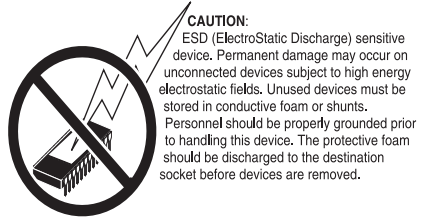


## ABSOLUTE MAXIMUM RATINGS

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           |
| <b>Input Voltages</b>          |                 |
| Logic.....                     | -0.3V to +6.0V  |
| Drivers.....                   | -0.3V to +6.0V  |
| Receivers.....                 | +/-15V          |
| <b>Output Voltages</b>         |                 |
| Drivers.....                   | +/-15V          |
| Receivers.....                 | -0.3V to +6.0V  |
| Storage Temperature.....       | -65°C to +150°C |
| <b>Power Dissipation</b>       |                 |
| 8-pin NSOIC.....               | 500mW           |
| (derate 6.14mW/°C above +70°C) |                 |



## ELECTRICAL CHARACTERISTICS

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

| PARAMETERS                                                                         | MIN. | TYP. | MAX.     | UNITS   | CONDITIONS                                   |
|------------------------------------------------------------------------------------|------|------|----------|---------|----------------------------------------------|
| <b>DRIVER</b>                                                                      |      |      |          |         |                                              |
| <b>DC Characteristics</b>                                                          |      |      |          |         |                                              |
| Differential Output Voltage                                                        | GND  |      | $V_{CC}$ | Volts   | Unloaded; $R = \infty$ ; 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, DI, $\overline{RE}$           |
| Input Low Voltage                                                                  |      |      | 0.8      | Volts   | Applies to DE, DI, $\overline{RE}$           |
| Input Current                                                                      |      |      | +/-10    | $\mu A$ | Applies to DE, DI, $\overline{RE}$           |
| Driver Short Circuit Current, $V_{OUT} = HIGH$                                     |      |      | +/-250   | mA      | $-7V \leq V_O \leq +12V$ ; Figure 8          |
| Driver Short Circuit Current, $V_{OUT} = LOW$                                      |      |      | +/-250   | mA      | $-7V \leq V_O \leq +12V$ ; Figure 8          |
| <b>DRIVER</b>                                                                      |      |      |          |         |                                              |
| <b>AC Characteristics</b>                                                          |      |      |          |         |                                              |
| Max. Transmission Rate                                                             | 250  |      |          | kbps    | $\overline{RE} = V_{CC}$ , DE = $V_{CC}$     |
| Driver Input to Output, $t_{PLH}$                                                  | 400  | 900  | 1500     | ns      | Figures 2 & 9                                |
| Driver Input to Output, $t_{PHL}$                                                  | 400  | 900  | 1500     | ns      | Figures 2 & 9                                |
| Differential Driver Skew                                                           |      | 10   |          | ns      | $ t_{D01} - t_{D02} $ , Figures 2 and 10,    |
| Driver Rise or Fall Time                                                           |      | 700  | 1000     | ns      | From 10%-90%; Figures 3 and 10               |

## ELECTRICAL CHARACTERISTICS

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

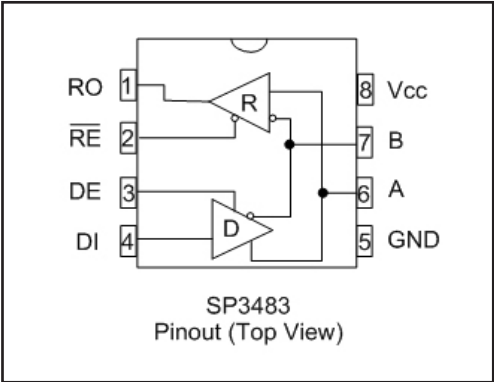
| PARAMETERS                                   | MIN.         | TYP. | MAX. | UNITS      | CONDITIONS                                        |
|----------------------------------------------|--------------|------|------|------------|---------------------------------------------------|
| <b>DRIVER (continued)</b>                    |              |      |      |            |                                                   |
| <b>AC Characteristics</b>                    |              |      |      |            |                                                   |
| Driver Enable to Output High                 |              | 700  | 1300 | ns         | Figures 4 and 11,                                 |
| Driver Enable to Output Low                  |              | 690  | 1300 | ns         | Figures 5 and 11                                  |
| Driver Disable Time from High                |              | 80   | 120  | ns         | Figures 5 and 11                                  |
| Driver Disable Time from Low                 |              | 90   | 120  | ns         | Figures 4 and 11                                  |
| <b>RECEIVER</b>                              |              |      |      |            |                                                   |
| <b>DC Characteristics</b>                    |              |      |      |            |                                                   |
| Differential Input Threshold                 | -0.2         |      | +0.2 | Volts      | $-7V \leq V_{CM} \leq +12V$                       |
| Input Hysteresis                             |              | 20   |      | 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 | $\mu A$    | $0V \leq V_O \leq V_{CC}; \overline{RE} = V_{CC}$ |
| 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                        | 7            |      | 60   | mA         | $0V \leq V_{CM} \leq V_{CC}$                      |
| <b>RECEIVER</b>                              |              |      |      |            |                                                   |
| <b>AC Characteristics</b>                    |              |      |      |            |                                                   |
| Max. Transmission Rate                       | 250          |      |      | kbps       | $\overline{RE} = 0V, DE = 0V$                     |
| Receiver Input to Output, $t_{RPLH}$         | 35           | 70   | 120  | ns         | Figures 6 and 12                                  |
| Receiver Input to Output, $t_{RPHL}$         | 35           | 70   | 120  | ns         | Figures 6 and 12                                  |
| Differential Receiver Skew                   |              | 50   |      | ns         | $ t_{RPHL} - t_{RPLH} $ , Figures 6 and 12        |
| Receiver Enable to Output Low                |              | 45   | 70   | ns         | Figures 7 and 13; $S_1$ Closed, $S_2$ open        |
| Receiver Enable to Output High               |              | 45   | 70   | ns         | Figures 7 and 13; $S_2$ Closed, $S_1$ open        |
| Receiver Disable from LOW                    |              | 45   | 70   | ns         | Figures 7 and 13; $S_1$ Closed, $S_2$ open        |
| Receiver Disable from High                   |              | 45   | 70   | ns         | Figures 7 and 13; $S_2$ Closed, $S_1$ open        |

# ELECTRICAL CHARACTERISTICS

T<sub>MIN</sub> to T<sub>MAX</sub> and V<sub>CC</sub> = +3.3V +/-5% unless otherwise noted.

| PARAMETERS                                   | MIN. | TYP. | MAX. | UNITS | CONDITIONS                                                         |
|----------------------------------------------|------|------|------|-------|--------------------------------------------------------------------|
| <b>Shutdown Timing</b>                       |      |      |      |       |                                                                    |
| Time to Shutdown                             | 50   | 200  | 600  | ns    | $\overline{RE} = 5V, DE = 0V$                                      |
| Driver Enable from Shutdown to Output High   |      |      | 2000 | ns    | Figures 4 and 11                                                   |
| Driver Enable from Shutdown to Output Low    |      |      | 2000 | ns    | Figures 5 and 11                                                   |
| Receiver Enable from Shutdown to Output High |      |      | 2500 | ns    | Figures 7 and 13; S <sub>2</sub> Closed, S <sub>1</sub> open       |
| Receiver Enable from Shutdown to Output Low  |      |      | 2500 | ns    | Figures 7 and 13; S <sub>1</sub> Closed, S <sub>2</sub> open       |
| <b>POWER REQUIREMENTS</b>                    |      |      |      |       |                                                                    |
| Supply Current                               |      |      |      |       |                                                                    |
| No Load                                      |      | 1000 | 2000 | μA    | $\overline{RE}, DI = 0V$ or V <sub>CC</sub> ; DE = V <sub>CC</sub> |
|                                              |      | 800  | 1500 | μA    | $\overline{RE} = 0V, DI = 0V$ or 5V; DE = 0V                       |
| Shutdown Mode                                |      |      | 10   | μA    | DE = 0V, $\overline{RE} = V_{CC}$                                  |

# PIN FUNCTION



- Pin 1 - RO - Receiver Output
- Pin 2 -  $\overline{RE}$  - Receiver Output Enable Active LOW
- Pin 3 - DE - Driver Output Enable Active HIGH
- Pin 4 - DI - Driver Input
- Pin 5 - GND - Ground Connection
- Pin 6 - A - Driver Output / Receiver Input Non-Inverting
- Pin 7 - B - Driver Output / Receiver Input Inverting
- Pin 8 - Vcc - Positive Supply

## TEST CIRCUITS

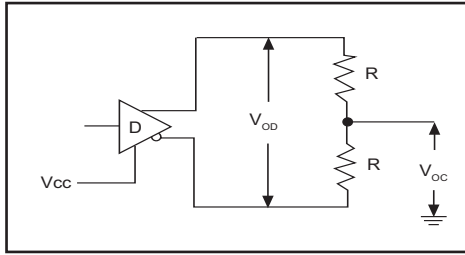


Figure 1. Driver DC Test Load Circuit

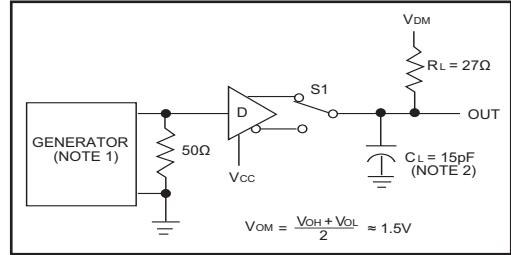


Figure 2. Driver Propagation Delay Test Circuit

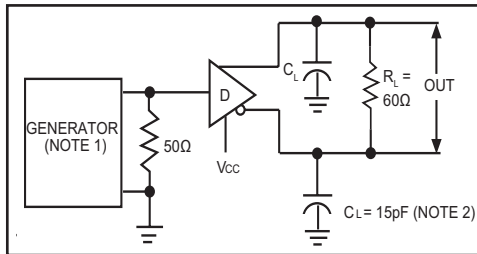


Figure 3. Driver Differential Output Delay and Transition Time Circuit.

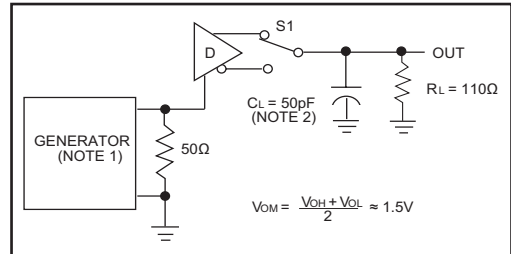


Figure 4. Driver Enable and Disable Timing Circuit, Output High

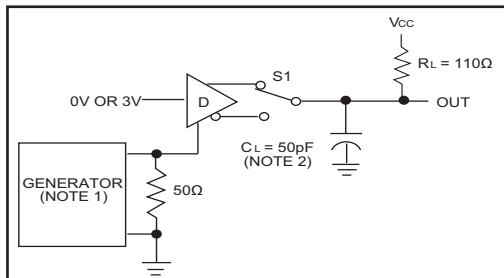


Figure 5. Driver Enable and Disable Timing Circuit, Output Low

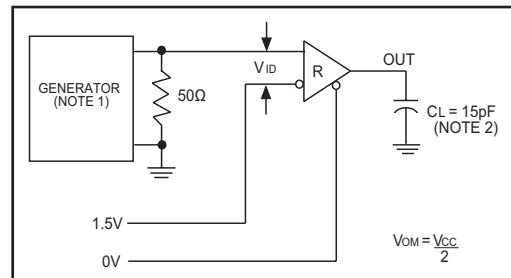


Figure 6. Receiver Propagation Delay Test Circuit

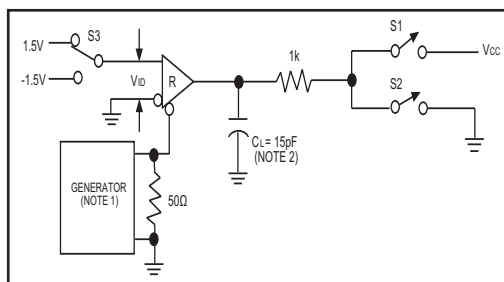


Figure 7. Receiver Enable and Disable Timing Circuit

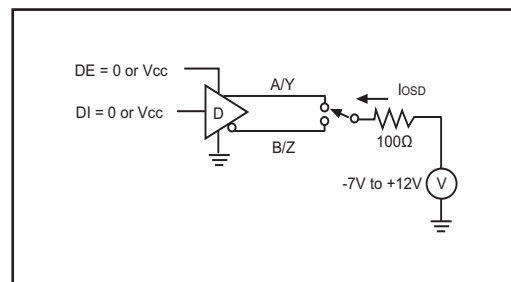


Figure 8. Driver Short Circuit Current Limit Test

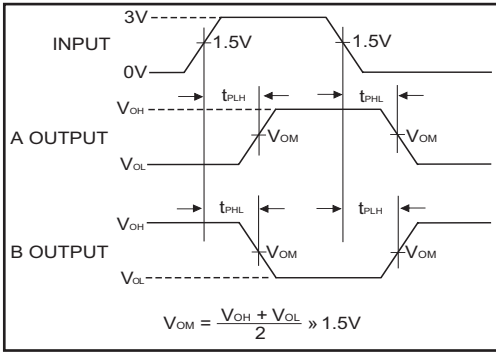


Figure 9. Driver Propagation Delay Waveforms

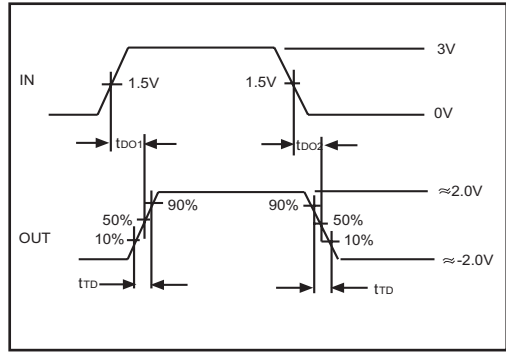


Figure 10. Driver Differential Output Delay and Transition Time Waveforms

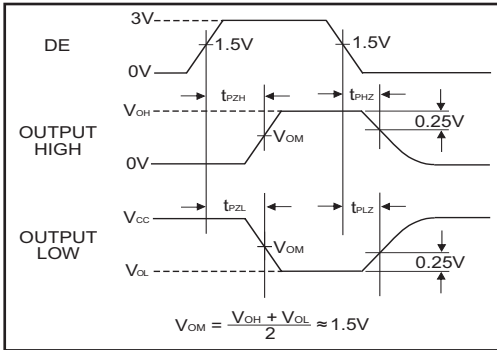


Figure 11. Driver Enable and Disable Timing Waveforms

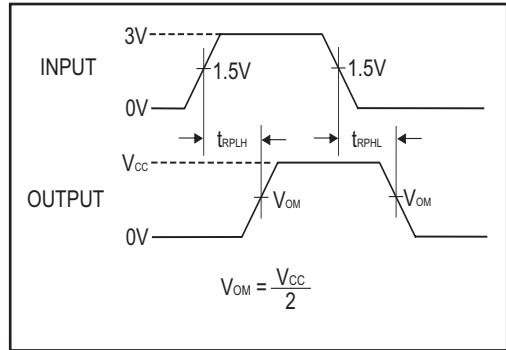


Figure 12. Receiver Propagation Delay Waveforms

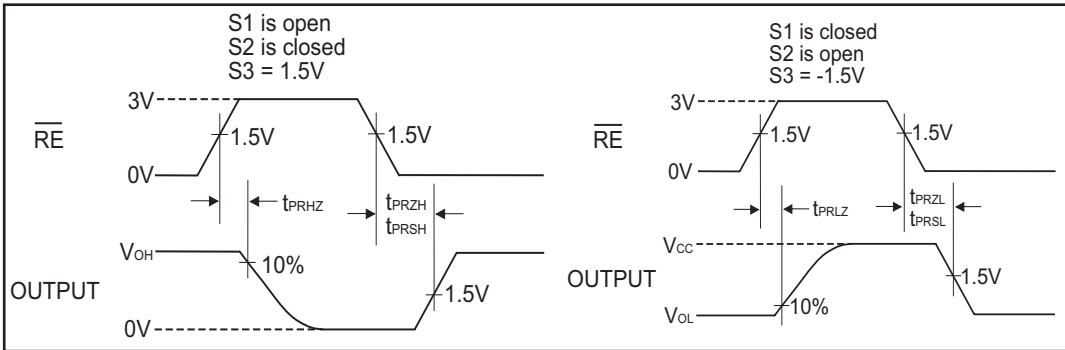


Figure 13. Receiver Enable and Disable Waveforms

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 **SP3483** device is part of a family of +3.3V low power half-duplex transceivers that meet the specifications of the RS-485 and RS-422 serial protocols. This device is pin-to-pin compatible with the **Exar** SP483 device as well as popular industry standards. The **SP3483** features **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 driver outputs of the **SP3483** are differential outputs meeting the RS-485 and RS-422 standards. The typical voltage output swing with no load will be 0 Volts to +3.3 Volts. With worst case loading of 54Ω across the differential outputs, the drivers can maintain greater than 1.5V voltage levels. The drivers have an enable control line which is active HIGH. A logic HIGH on DE (pin 3) will enable the differential driver outputs. A logic LOW on the DE (pin 3) will force the driver outputs into high impedance (high-Z).

The **SP3483** has internally slew rate limited driver outputs to minimize EMI. The transceivers will operate up to 250kbps. The 250mA  $I_{sc}$  maximum limit on the driver output allows the **SP3483** to withstand an infinite short circuit over the -7.0V to +12V common mode range without catastrophic damage to the IC.

### Receivers

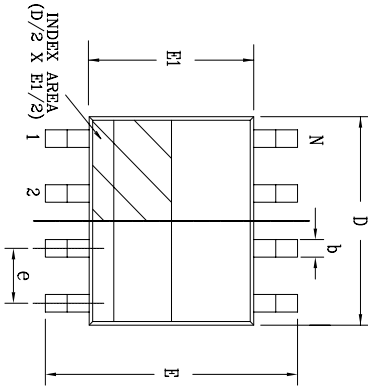
The **SP3483** receiver has differential inputs with an input sensitivity as low as  $\pm 200\text{mV}$ . Input impedance of the receivers is typically 15kΩ (12kΩ minimum). A wide common mode range of -7V to +12V allows for large ground potential differences between systems. The receiver of the **SP3483** has a tri-state enable control input  $\overline{RE}$  (Pin 2). A logic LOW on  $\overline{RE}$  will enable the receiver, a logic HIGH on  $\overline{RE}$  will disable the receiver.

The receiver of the **SP3483** will operate up to 250kbps. The receiver is equipped with the fail-safe feature. Fail-safe guarantees that the receiver output will be in a HIGH state when the input is left unconnected (open circuit).

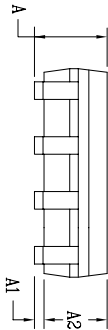
### Shutdown Mode

The **SP3483** is equipped with a Shutdown mode. To enable the shutdown state, both driver and receiver must be disabled simultaneously. A logic LOW on DE (pin 3) and a Logic HIGH on  $\overline{RE}$  (pin 2) will put the **SP3483** into Shutdown mode. In Shutdown, supply current will drop to typically 1μA, 10μA maximum.

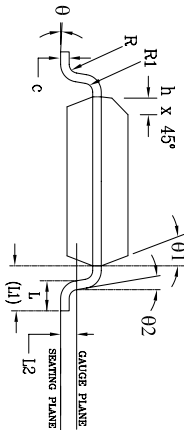
| REVISION HISTORY |                                      |          |       |  |
|------------------|--------------------------------------|----------|-------|--|
| REV.             | DESCRIPTION                          | DATE     | APP'D |  |
| A                | DRAWING ORIGINATOR                   | 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               |             |

| ORDERING INFORMATION |                      |               |
|----------------------|----------------------|---------------|
| Model                | Temperature Range    | Package Types |
| SP3483CN-L .....     | 0°C to +70°C .....   | 8-pin NSOIC   |
| SP3483CN-L/TR .....  | 0°C to +70°C .....   | 8-pin NSOIC   |
| SP3483EN-L .....     | -40°C to +85°C ..... | 8-pin NSOIC   |
| SP3483EN-L/TR .....  | -40°C to +85°C ..... | 8-pin NSOIC   |

Note: /TR = Tape and Reel

## REVISION HISTORY

| DATE     | REVISION | DESCRIPTION                                                                                                                                                                                                                   |
|----------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 06/23/04 | --       | Legacy Sipex Datasheet                                                                                                                                                                                                        |
| 01/09/12 | 1.0.0    | Convert to Exar Format. Update ordering information as a result of discontinued Lead type package options. Add new Figure 8 - Driver Short Circuit Current Limit Test Circuit. Correct type error for no load supply current. |

### Notice

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Datasheet January 2012

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