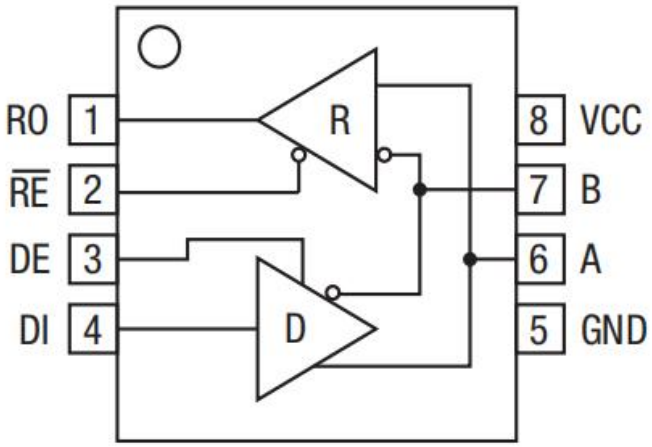
1. DESCRIPTION

The XL3483 device is part of a family of 3.3V low power halfduplex transceivers that meet the specifications of the RS-485 and RS-422 serial protocols. The XL3483 isslew rate limited to reduce EMI and can meet the requirements of the RS-485 and RS-422protocols up to 25 0kbps.

2. FEATURES

- RS-485 and RS-422 transceiver
- Operates from a single 3.3V Supply
- Interoperable with 5.0V logic
- Driver/receiver enable
- Low power shutdown mode
- -7V to +12V common-mode input voltage range
- Allows up to 32 transceivers on the serial bus
- Compatibility with the industry standard 75176 pinout
- Driver output short-circuit protection
- Slew rate limited driver for low EMI

3. PIN FUNCTIONS



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

4. ABSOLITE 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.

- VCC 6.0V
- Input Voltages

  Logic ..... -0.3V to 6.0V

  Drivers .... -0.3V to 6.0V

  Receivers..... .....±15V
- Output Voltages

  Drivers..... -0.3V to 6.0V

  Receivers .....±15V
- Storage Temperature .....-65˚C to +150˚C
- Maximum Junction Temperature.....125˚C
- Power Dissipation

  8-pin NSOIC 500mW

  (derate 6.14mW/°C above +70°C)

5. OPERATING CONDITIONS

- Package Power Dissipation

  8-pin NSOIC ΘJA..... 128.4˚C/W

6. ESD RATIONG

- Human Body Model (HBM)..... ±2kV

7. ELECTRICAL CHARACTERISTICS

T_{AMB} = T_{MIN} to T_{MAX} and V_{CC} = 3.3V ±5% unless otherwise noted.

PARAMETERS	MIN	TYP	MAX	UNITS	CONDITIONS
XL3483 Driver DC Characteristics					
Differential output voltage			V_{CC}	V	Unloaded; R = ∞Ω ; Figure 1
Differential output voltage	2		V_{CC}	V	With Load; R = 50Ω (RS-422); Figure 1
Differential output voltage	1.5		V_{CC}	V	With Load; R = 27Ω (RS-485); Figure 1
Change in magnitude of driver differential output voltage for complimentary states			0.2	V	R = 27Ω or R = 50Ω; Figure 1
Driver common-mode output voltage			3	V	R = 27Ω or R = 50Ω; Figure 1
Input high voltage	2.0			V	Applies to DE, DI, $\overline{RE}$
Input low voltage			0.8	V	Applies to DE, DI, $\overline{RE}$
Input current			±10	μA	Applies to DE, DI, $\overline{RE}$
Driver short circuit current V_{OUT} = HIGH			±250	mA	-7V ≤ V_O ≤ +12V; Figure 8
Driver short circuit current V_{OUT} = LOW			±250	mA	-7V ≤ V_O ≤ +12V; Figure 8
XL3483 Driver AC Characteristics					
Maximum data 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	$\lvert t_{DO1} - t_{DO2} \rvert$, Figures 2 and 10
Driver rise or fall time		700	1000	ns	From 10%-90%; Figures 3 and 10

ELECTRICAL CHARACTERISTICS(Continued)

T_{AMB} = T_{MIN} to T_{MAX} and V_{CC} = 3.3V ±5% unless otherwise noted.

PARAMETERS	MIN	TYP	MAX	UNITS	CONDITIONS
XL3483 Driver AC Characteristics (Continued)					
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
XL3483 Receiver DC Characteristics					
Differential input threshold	-0.2		0.2	Volts	-7V ≤ V_{CM} ≤ 12V
Input hysteresis		20		mV	V_{CM} = 0V
Output voltage HIGH	V_{CC}-0.4			Volts	V_{ID} = 200mV, I_O = -1.5mA
Output voltage LOW			0.4	Volts	V_{ID} = -200mV, I_O = 2.5mA
Three-state (high impedance) output current			±1	µA	0V ≤ V_O ≤ V_{CC}; $\overline{RE}$ = V_{CC}
Input resistance	12	15		kΩ	-7V ≤ V_{CM} ≤ 12V
Input current (A, B); VIN = 12V			1.0	mA	DE = 0V, V_{CC} = 0V or 3.6V, V_{IN} = 12V
Input current (A, B); VIN = -7V			-0.8	mA	DE = 0V, V_{CC} = 0V or 3.6V, V_{IN} = -7V
Short circuit current	7		60	mA	0V ≤ V_{CM} ≤ V_{CC}
XL3483 Receiver AC Characteristics					
Maximum data rate	250			kbps	$\overline{RE}$ = 0V, DE = 0V
Receiver input to output, tRPLH	35	70	120	ns	Figures 6 and 12
Receiver input to output, tRPHL	35	70	120	ns	Figures 6 and 12
Differential receiver skew		50		ns	t_{RSKEW} = |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

T_{AMB} = T_{MIN} to T_{MAX} and V_{CC} = 3.3V ±5% unless otherwise noted

PARAMETERS	MIN	TYP	MAX	UNITS	CONDITIONS
XL3483 Shutdown Timing					
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
Receivers enabled from shutdown to output high			2500	ns	Figures 7 and 13, S2 closed, S1 open
Receivers enabled from shutdown to output low			2500	ns	Figures 7 and 13, S1 closed, S2 open
Power Requirements					
Supply current, no load		1000	2000	µA	$\overline{RE}$, DI = 0V or V_{CC} ; DE = V_{CC}
Supply current, no load		800	1500	µA	$\overline{RE}$ = 0V, DI = 0V or V_{CC}, DE = 0V
Shutdown mode			10	µA	DE = 0V, $\overline{RE}$ = V_{CC}

8. TEST CIRCUITS

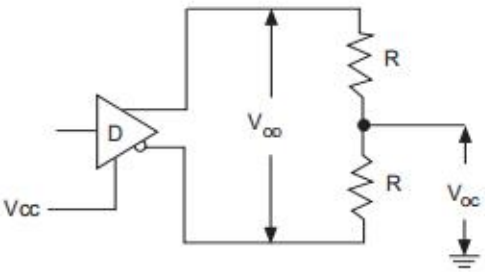


Figure 1. Driver DC Test Load Circuit

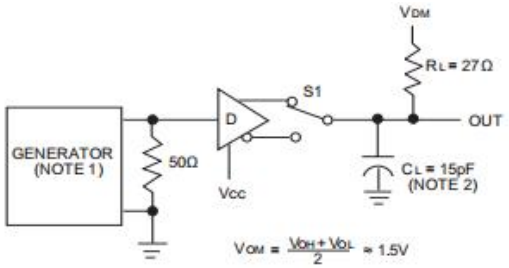


Figure 2. Driver Propagation Delay Test Circuit

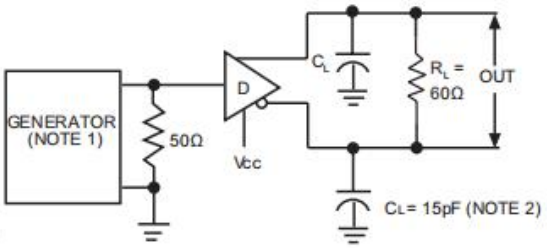


Figure 3. Driver Differential Output Delay and Transition Time Circuit.

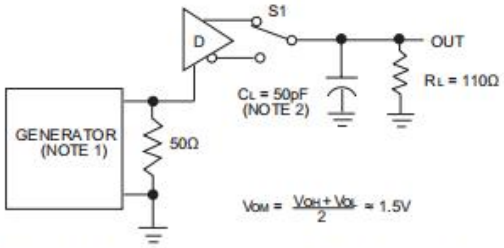


Figure 4. Driver Enable and Disable Timing Circuit, Output High

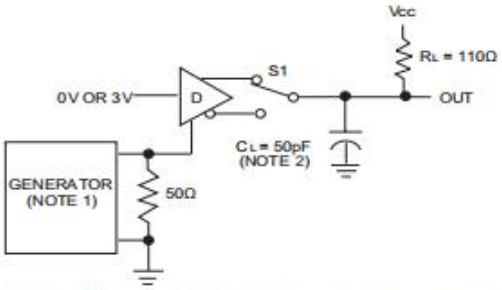


Figure 5. Driver Enable and Disable Timing Circuit, Output Low

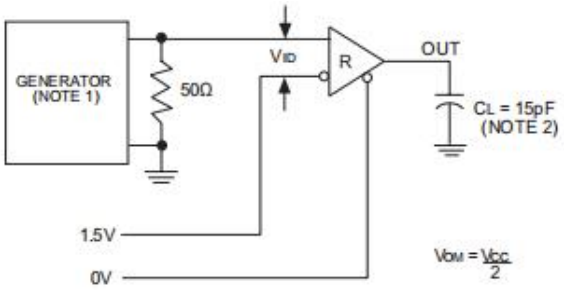


Figure 6. Receiver Propagation Delay Test Circuit

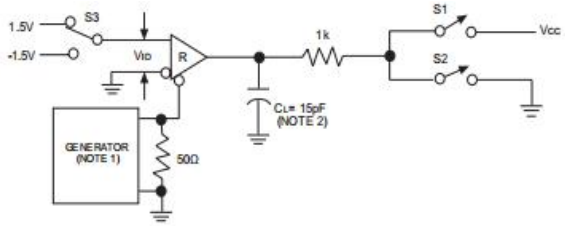


Figure 7. Receiver Enable and Disable Timing Circuit

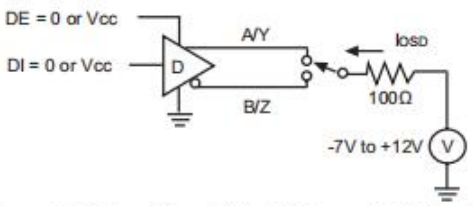


Figure 8. Driver Short Circuit Current Limit Test

9. SWITCHING WAVEFORMS

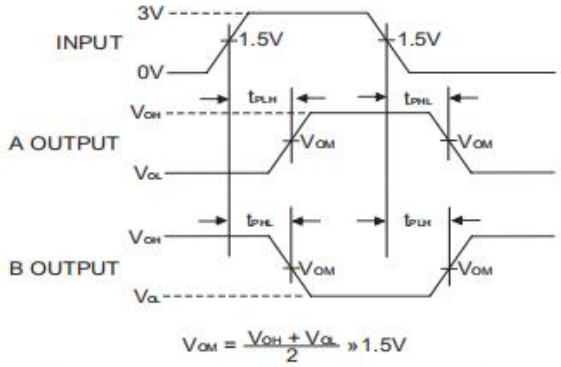


Figure 9. Driver Propagation Delay Waveforms

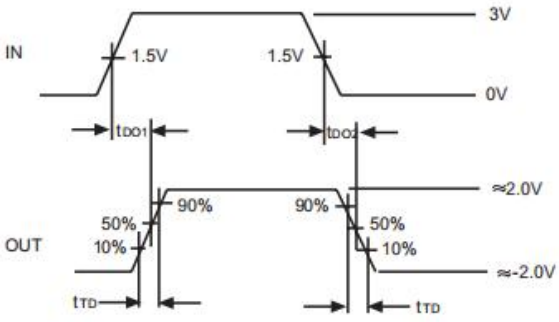


Figure 10. Driver Differential Output Delay and Transition Time Waveforms

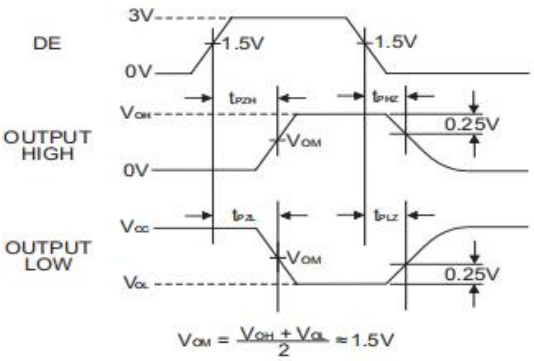


Figure 11. Driver Enable and Disable Timing Waveforms

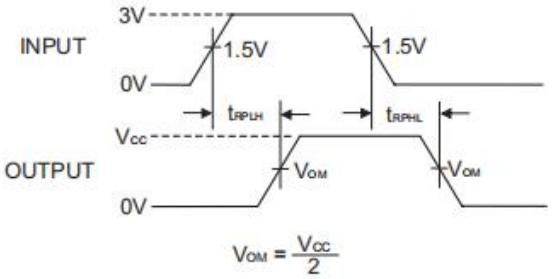


Figure 12. Receiver Propagation Delay Waveforms

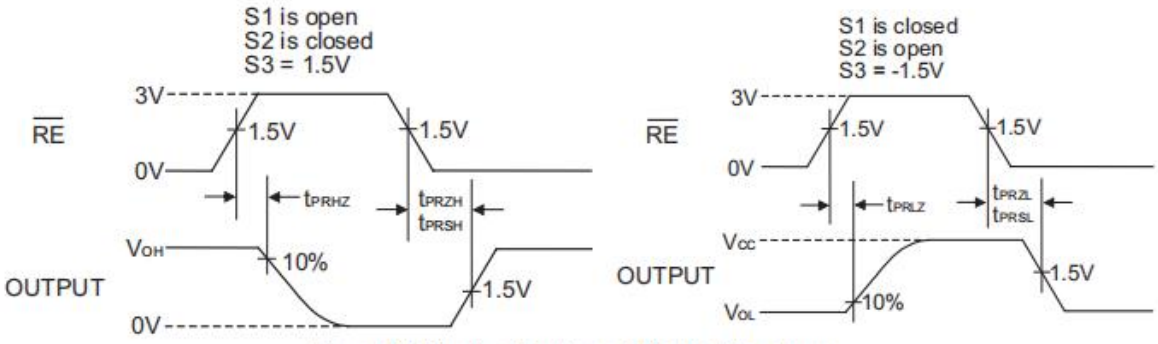


Figure 13. Receiver Enable and Disable Waveforms

NOTES
1: The input pulse is supplied by a generator with the following characteristics:
PRR = 250kHz, 50% duty cycle, tR < 6.0ns, ZO = 50Ω.
2: CL includes probe and stray capacitance

10. DESCRIPTION(continued)

The XL3483 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.

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.

10.1. Drivers

The driver outputs of the XL3483 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 XL3483 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 XL3483 to withstand an infinite short circuit over the -7.0V to 12V common mode range without catastrophic damage to the IC.

10.2. Receivers

The XL3483 receiver has differential inputs with an input sensitivity as low as ±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 receiver of the XL3483 has a tri-state enable control input RE (Pin 2). A logic LOW on RE will enable the receiver, a logic HIGH on RE will disable the receiver.

The receiver of the XL3483 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).

10.3. Shutdown Mode

The XL3483 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 RE (pin 2) will put the XL3483 into Shutdown mode. In Shutdown, supply current will drop to typically 1μA, 10μA maximum.

INPUTS				OUTPUTS	
$\overline{RE}$	DE	DI	LINECONDITION	B	A
X	1	1	No Fault	0	1
X	1	0	No Fault	1	0
X	0	X	X	Z	Z

Table 1. Transmit Function Truth Table

INPUTS			OUTPUTS
$\overline{RE}$	DE	A-B	R
0	0	0.2V	1
0	0	-0.2V	0
0	0	Inputs Open	1
1	0	X	Z

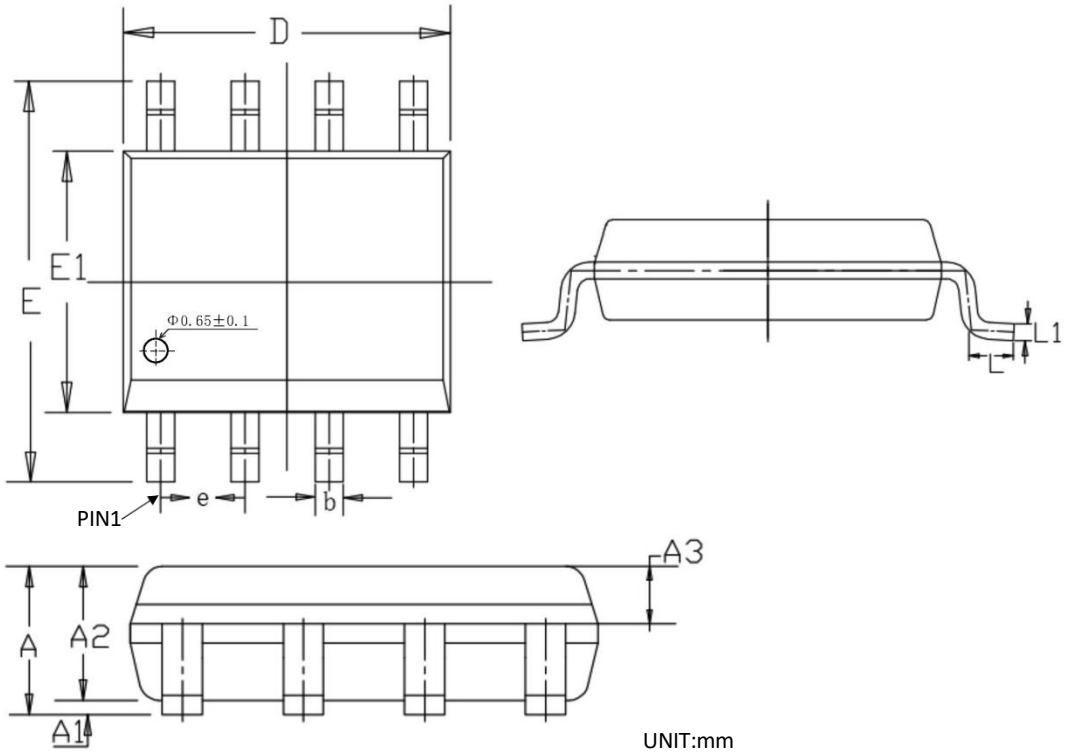
11. ORDERING INFORMATION

Ordering Information

Part Number	Device Marking	Package Type	Body size (mm)	Temperature (°C)	MSL	Transport Media	Package Quantity
XL3483	XL3483	SOP8	4.90 * 3.90	- 40 to 85	MSL3	T&R	2500

12. DIMENSIONAL DRAWINGS

SOP8



UNIT:mm

	MIN	NOM	MAX
A	1.450	1.550	1.650
A1	0.100	0.150	0.200
A2	1.300	1.400	1.500
A3	0.600	0.650	0.700
b	0.380	–	0.510
e	1.240	1.270	1.300
D	4.800	4.900	5.000
E	5.800	6.000	6.200
E1	3.800	3.900	4.000
L	0.450	0.600	0.750
L1	—	0.25BSC	—