

钍地半导体
Tudi Semiconductor

Product Specification

TUDI-ADM1486ARZ

5 V, 0.8 mA PROFIBUS RS-485 Transceiver

网址 www.sztdbdt.com

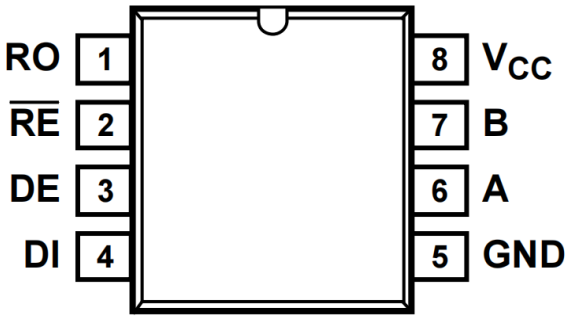
用芯智造·卓越品质

semiconductor device manufacturer

- Design
- research and development
- production
- and sales

FEATURES

- Meets and exceeds EIA RS-485 and EIA RS-422 standards
- 30 Mbps data rate
- Recommended for PROFIBUS applications
- 2.1 V minimum differential output with 54Ωtermination
- Low power 0.8 mA I_{CC}
- Thermal shutdown and short-circuit protection
- 0.5 ns skew driver and receiver
- Driver propagation delay: 11 ns
- Receiver propagation delay: 12 ns
- High impedance outputs with drivers disabled or power off
- Superior upgrade for SN65ALS1176
- Available in standard 8-lead SOIC package



Pin Configuration

APPLICATIONS

- Industrial field equipment

DESCRIPTION

The ADM1486 is a differential line transceiver suitable for high speed bidirectional data communication on multipoint bus transmission lines. It is designed for balanced data transmission , complies with EIA Standards RS-485 and RS-422, and is recom-mended for PROFIBUS applications. The part contains a differential line driver and a differential line receiver. Both the driver and the receiver may be enabled independently.When disabled or powered down,the driver outputs are high impedance.

The ADM1486 operates from a single 5 V power supply. Excessive power dissipation caused by bus contention or output shorting is prevented by short-circuit protection and thermal circuitry. Short-circuit protection circuits limit the maximum output current to ±200 mA during fault conditions.A thermal shutdown circuit senses if the die temperature rises above 150°C and forces the driver outputs into a high impedance state under this condition.

Up to 50 transceivers may be connected simultaneously on a bus, but only one driver should be enabled at a time. Therefore, it is important that the remaining disabled drivers do not load the bus

To ensure this, the ADM1486 driver features high output impedance when disabled and when powered down. This minimizes the loading effect when the transceiver is not being used. The high impedance driver output is maintained over the entire common-mode voltage range from 7 V to +12 V.

The receiver contains a fail-safe feature that results in a logic high output state if the inputs are unconnected (floating).

The ADM1486 is fabricated on BiCMOS, an advanced mixed technology process combining low power CMOS with fast switching bipolar technology.All inputs and outputs contain protection against ESD; all driver outputs feature high source and sink current capability.An epitaxial layer is used to guard against latch-up.
The ADM1486 features extremely fast and closely matched switching, enable, and disable times. Minimal driver propaga-tion delays permit transmission at data rates up to 30 Mbps while low skew minimizes EMI interference.
The part is fully specified over the commercial and industrial temperature range and is available in an 8-lead SOIC package.

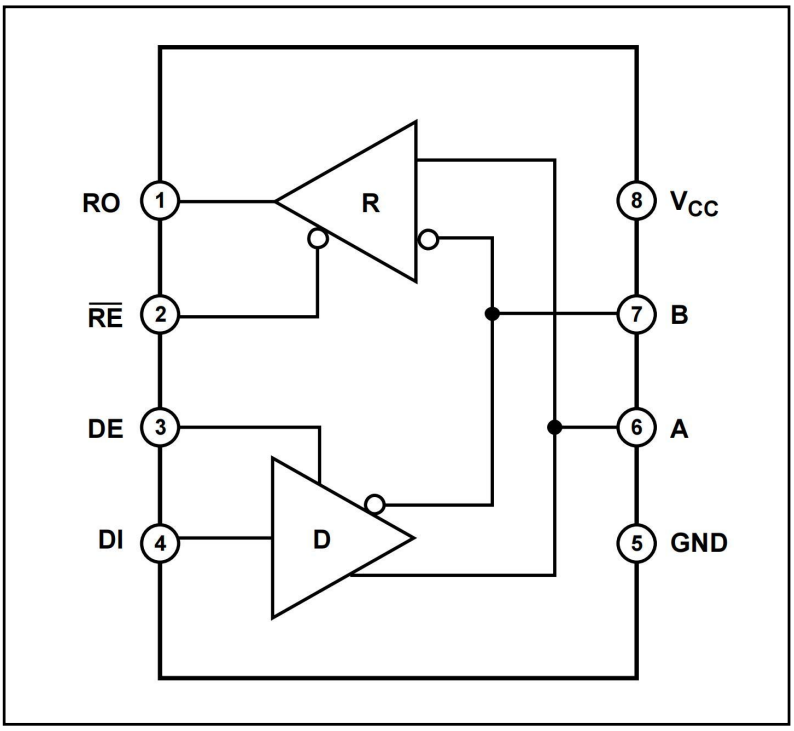


Figure 1.FUNCTIONAL BLOCK DIAGRAM

Table 1. Pin Function Descriptions

Pin No	Mnemonic	Description
1	RO	Receiver Output.When enabled,if A>Bby 200 mV,RO=high.If A<B by 200 mV, RO=low.
2	RE	Receiver Output Enable.A low level enables the receiver output,RO.A high level places it in a high impedance state.
3	DE	Driver Output Enable.A high level enables the driver differential outputs,A and B.A low level places it in a highimpedance state.
4	DI	Driver Input.When the driver is enabled,a logic low on DI forces A low and B high,while a logic high on DI forcesA high and B low.
5	GND	Ground Connection,OV.
6	A	Noninverting Receiver Input A/Driver Output A.
7	B	Inverting Receiver Input B/Driver Output B.
8	V_{CC}	Power Supply,5V±5%.

Table 2. Transmitting

DE Input	DI Input	B Output	A Output
1	1	0	1
1	0	1	0
0	X	Z	Z

Table 3. Receiving

RE	A-BInput	RO OUTPUT
0	≥+0.2V	1
0	≤-0.2V	0
0	Inputs open	1
1	X	Z

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted.

Table 4.

Parameter	Rating
V_{CC}	7V
Inputs	
Driver Input(DI)	-0.3V to V_{CC}+0.3V
Control Inputs(DE,RE)	-0.3 Vto V_{CC}+0.3V
Receiver Inputs(A,B)	-9V to +14V
Outputs	
Driver Outputs	-9V to +14V
Receiver Outputs	-0.5V to V_{CC}+0.5V
Power Dissipation 8-Lead SOIC	450 mW
θJA,Thermal Impedance	170℃/W
Operating Temperature Range	
Industrial (A Version)	-40℃ to +85℃
Storage Temperature Range	-65℃ to +150℃
Lead Temperature(Soldering,10 sec)	300℃
Vapor Phase(60 sec)	215℃
Infrared(15 sec)	220℃

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect device reliability.

SPECIFICATIONS

V_{CC} = 5 V ±5%. All specifications T_{MIN} to T_{MAX}, unless otherwise noted.

Table 5.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
DRIVER					
Differential Output Voltage,VoD			5.0	V	R=Infinity,see Figure 2
	2.1		5.0	V	V_{cc}=5V,R=50Ω(RS-422),see Figure 2
	2.1		5.0	V	R=27Ω(RS-485),see Figure 2
V_{OD3}	2.1		5.0	V	V_{TST}=-7V to +12V,see Figure 3
△|V_{OD}|for Complementary Output States			0.2	V	R=27 Ωor50Ω,see Figure 2
Common-Mode Output Voltage V_{oc}			3.0	V	R=27Ωor 50 Ω,see Figure 2
△|V_{oc}|for Complementary Output States			0.2	V	R=27Ω or 50Ω
Output Short-Circuit Current(V_{OUT}=High)	60		200	mA	-7V≤V_o≤+12V
Output Short-Circuit Current (V_{OUT}=Low)	60		200	mA	-7V≤V_o≤+12V
CMOS Input Logic Threshold Low,V_{INL}			0.8	V	
CMOS Input Logic Threshold High,V_{INH}	2.0			V	
Logic Input Current(DE,DI)			±1.0	μA	
RECEIVER					
Differential Input Threshold Voltage,V_{TH}	-0.2		+0.2	V	-7V≤V_{CM}≤+12V
Input Voltage Hysteresis,△V_{TH}		70		mV	V_{cm}=0V
Input Resistance	20	30		kΩ	-7V≤V_{CM}≤+12V
Input Current (A,B)			0.6	mA	V_{IN}=+12V
			-0.35	mA	V_{IN}=-7V
Logic Enable Input Current(RE)			± 1.0	μA	
CMOS Output Voltage Low,V_{OL}			0.4	V	I_{OUT}=+4.0 mA
CMOS Output Voltage High,V_{OH}	4.0			V	I_{OUT}=-4.0 mA
Short-Circuit Output Current	7		85	mA	V_{OUT}=GND or V_{cc}
Three-State Output Leakage Current			±1.0	μA	0.4V≤V_{OUT}≤2.4V
POWER SUPPLY CURRENT					
I_{cc}(Outputs Enabled)		1.2	2.0	mA	Outputs unloaded,digital inputs =GND or V_{cc}
I_{cc}(Outputs Disabled)		0.8	1.5	mA	Outputs unloaded,digital inputs =GND or V_{cc}

TIMING SPECIFICATIONS

V_{CC} = 5 V ±5%. All specifications T_{MIN} to T_{MAX}, unless otherwise noted.

Table 6.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
DRIVER					
Propagation Delay Input to Output t_{PLH},t_{PHL}	4	11	17	ns	R_{LDIFF}=54Ω,C_{L1}=C_{L2}=100 pF, see Figure 4
		11	13	ns	R_{LDIFF}=54Ω,C_{L1}=C_{L2}=100 pF@ T_A=25℃
Driver O/P to O/P t_{SKEW}		0.5	2	ns	R_{LDIFF}=54Ω,C_{L1}=C_{L2}=100 pF, see Figure 4
Driver Rise/Fall Time t_R,t_F		8	15	ns	R_{LDIFF}=54Ω,C_{L1}=C_{L2}=100 pF, see Figure 4
Driver Enable to Output Valid t_{ZH},t_{ZL}		9	15	ns	R_L=110Ω,C_L=50 pF,see Figure 5
Driver Disable Timing t_{HZ},t_{LZ}		9	15	ns	R_L=110Ω,C_L=50 pF,see Figure 5
Matched Enable Switching					
t $\lvert t_{AZH}-t_{BZL}\rvert$, $\lvert t_{BZH}-t_{AZL}\rvert$		1	3	ns	R_L=110Ω,C_L=50 pF,see Figure 5
Matched Disable Switching					
t $\lvert t_{AHZ}-t_{BLZ}\rvert$, $\lvert t_{BHZ}-t_{ALZ}\rvert$		2	5	ns	R_L=110Ω,C_L=50 pF,see Figure 5
RECEIVER					
Propagation Delay Input to Output t_{PLH},t_{PHL}	6	12	20	ns	C_L=15 pF,see Figure 6
Skew$\lvert t_{PLH}-t_{PHL}\rvert$		0.4	2	ns	C_L=15 pF,see Figure 6
Receiver Enable t_{ZH},t_{ZL}		7	13	ns	C_L=15 pF,R_L=1 kΩ,see Figure 7
Receiver Disable t_{HZ},t_{LZ}		7	13	ns	C_L=15 pF,R_L=1kΩ,see Figure 7

（1）Guaranteed by characterization.

TEST CIRCUITS

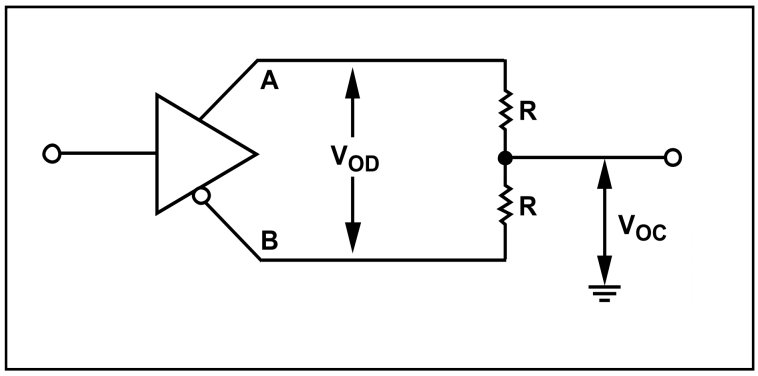


Figure 2. Driver Voltage Measurement

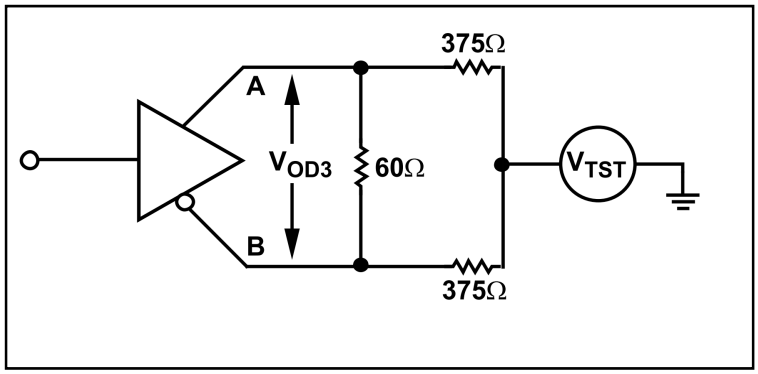


Figure 3. Driver Voltage Measurement

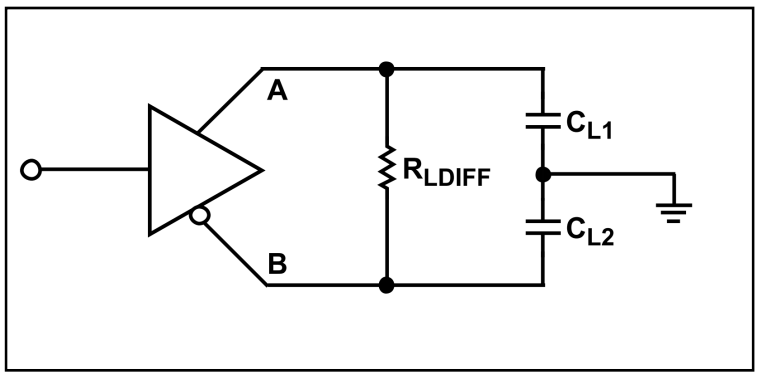


Figure 4. Driver Propagation Delay

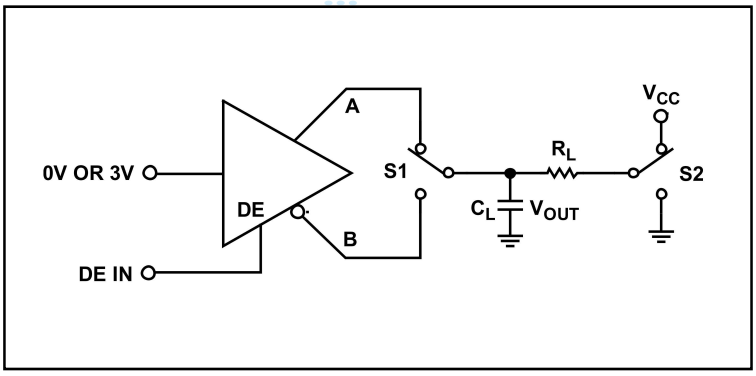


Figure 5. Driver Enable/Disable

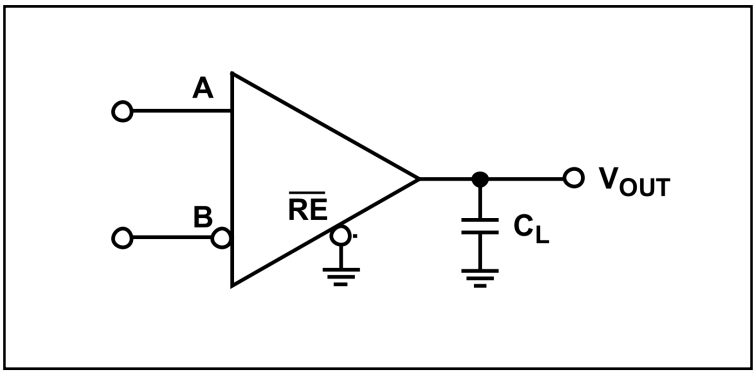


Figure 6. Receiver Propagation Delay

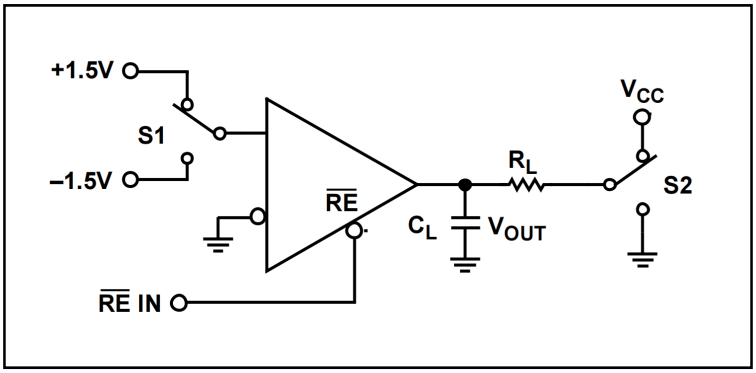


Figure 7. Receiver Enable/Disable

SWITCHING CHARACTERISTICS

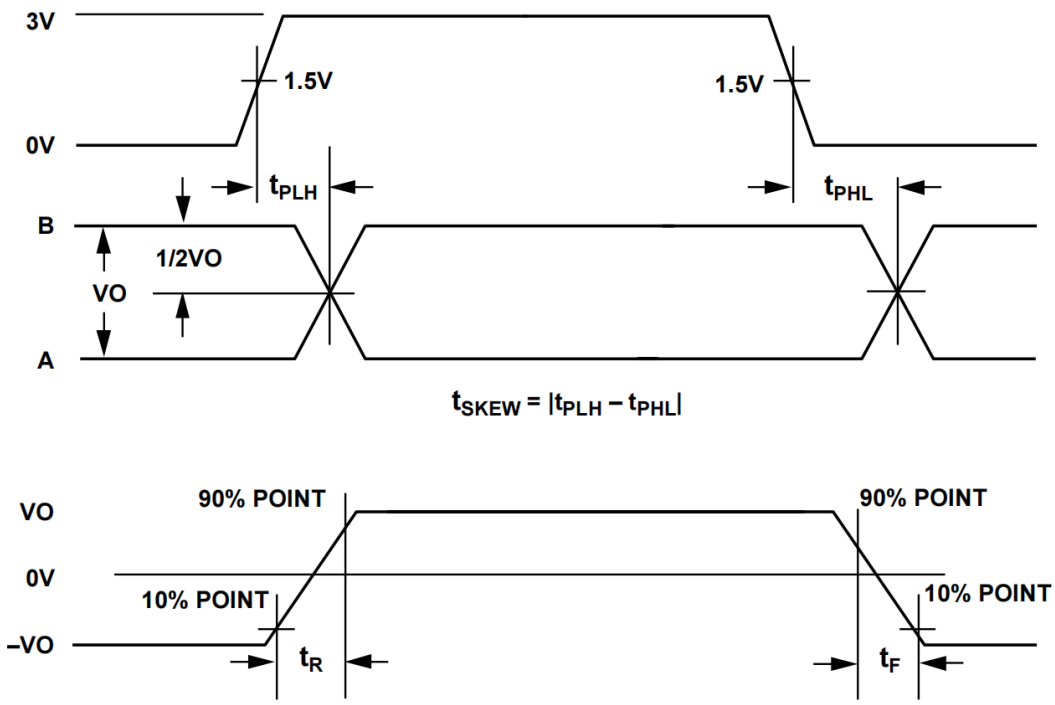


Figure 8. Driver Propagation Delay, Rise/Fall Timing

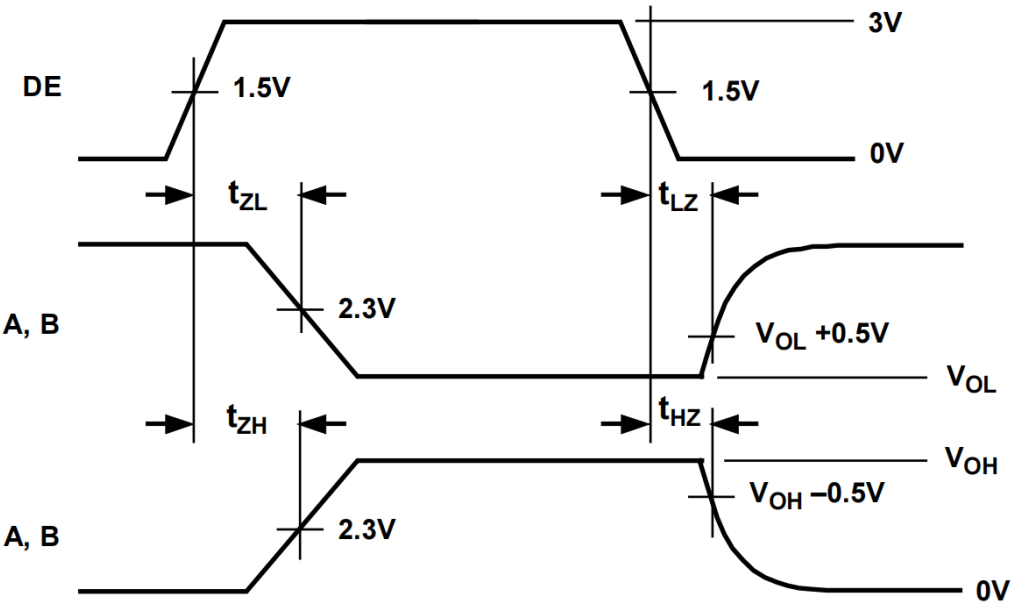


Figure 9 Driver Enable/Disable Timing

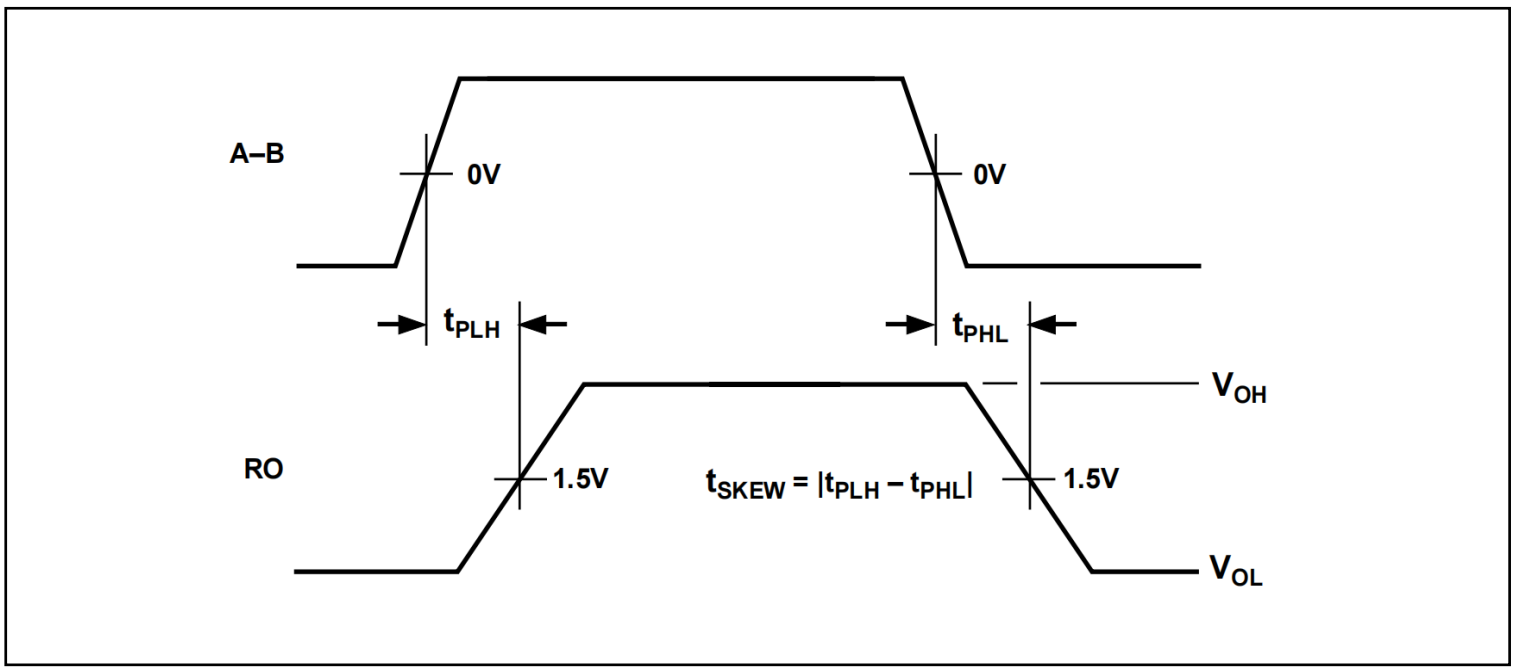


Figure 10. Receiver Propagation Delay

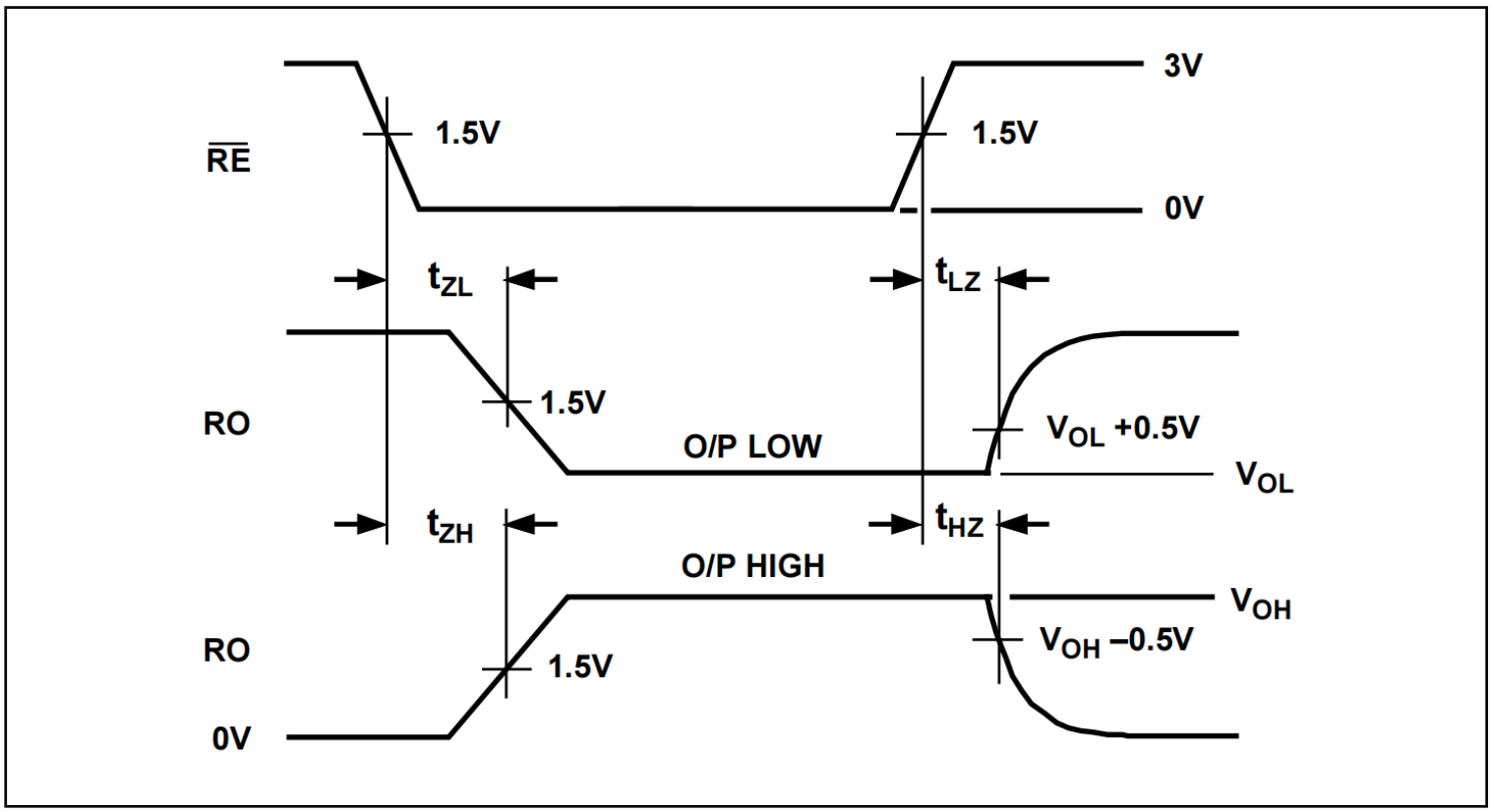


Figure 11. Receiver Enable/Disable Timing

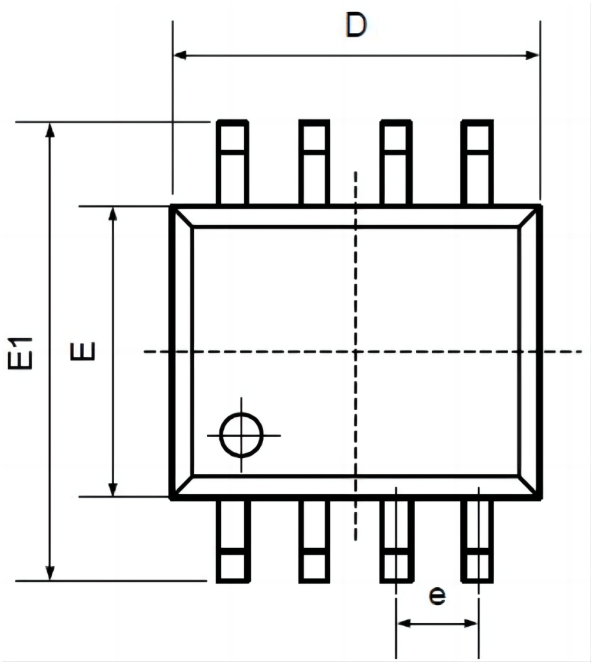
Order information

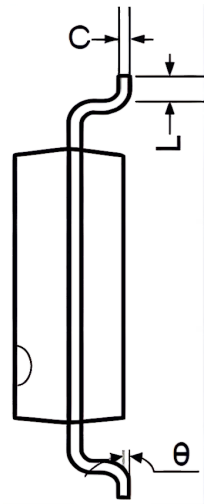
Order Number	Package	Package Quantity	Marking On The park	Temperature
ADM1486ARZ-REEL-TUDI	SOP8	Tape,Reel,4000	ADM1486ARZ	−40°C to +85°C

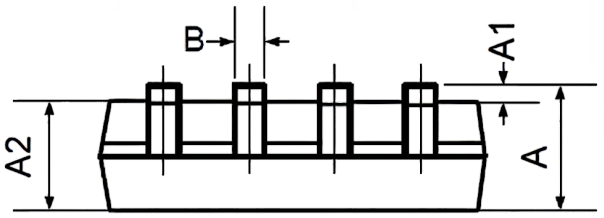
Revision history

	Date	Revision	Page
V1.0	2023/7	New	1-14

Package SOP8







Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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