



钛迪半导体  
Tudi Semiconductor

Tudi Semiconductor

## Product Specification

TUDI-MAX3081E

Fail-Safe, High-Speed (115kbps),  
Slew-Rate-Limited RS-485/RS-422 Transceivers

网址 [www.sztbdbdt.com](http://www.sztbdbdt.com)

用芯智造 · 卓越品质

**semiconductor device  
manufacturer**

- Design
- research and development
- production
- and sales



## Features

- ESD protection for RS-485 I/O pins  
±15kV, Human Body Model
- True fail-safe receiver maintains IA/IA-485 compatibility
- Enhanced slew rate limiting to facilitate error-free data transmission
- Up to 256 transceivers allowed on the bus

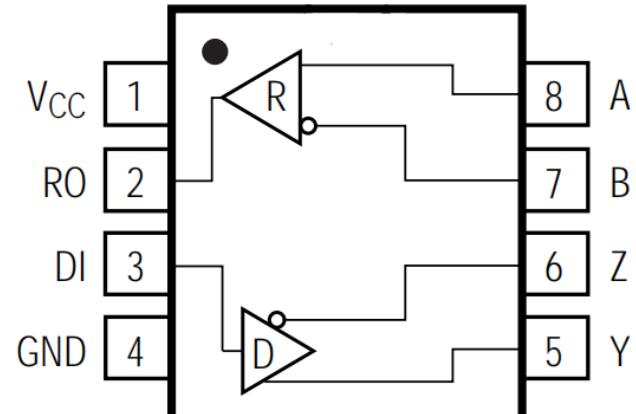


Figure 1. Pin Diagram

## Description

The MAX3081E is a high-speed, RS-485/RS-422 communication transceiver with ±15kV ESD protection that contains a driver and a receiver. These devices guarantee a logic-high receiver output when the receiver input is open or shorted. This means that all the drivers on the terminated bus are disabled (high impedance), the receiver output will be logic-high. The MAX3081E has a reduced driver slew rate minimizes EMI and reduces reflections caused by improper cable termination, allowing for error-free data transmission up to 115kbps. All driver outputs and receiver inputs are protected ±15kV using a human body model. These transceivers typically consume low supply current when idle or when the driver is disabled. All devices have a receiver input impedance 1/8 unit load, allowing for a maximum of 256 transceivers on a bus. The MAX3081E is for full-duplex.

## Applications

- RS-422/RS-485 Communications
- Level Translators
- Transceivers for EMI-Sensitive Applications
- Industrial-Control Local Area Networks



## Pin description

Pin number	Pin name	Pin function
1	VCC	Power supply:3.0V VCC 5.5V
2	RO	Receiver output. If A-B is greater than or equal to +200mV, RO output is high level; if A-B is less than or equal to -200mV, RO output is low level.
3	DI	DI driver input. A low level on DI causes the in-phase terminal Y output to be low and the out-of-phase terminal Z output to be high; a high level on DI causes the in-phase terminal Y output to be high and the out-of-phase terminal Z output to be low.
4	GND	Landing
5	Y	Drive in-phase output terminal
6	Z	The inverting output of the driver
7	B	Receiver inverting input
8	A	Receiver in-phase input

## Extreme parameter

Parameter	Symbol	Big or small	Unit
Welding temperature range		300	°C
Operating temperature range		-40~125	°C
Storage operating temperature range		-60~150	°C
Continuous power consumption	SOP8	400	mW
	DIP8	700	mW
Supply voltage	VCC	+7	V
Control the port voltage	DI	-0.3~VCC+0.3	V
Bus-side input voltage	A、B	-8~13	V
Receiver output voltage	RO	-0.3~VCC+0.3	V

The maximum limit parameter value is the value beyond which irreversible damage to the device may occur. Under these conditions, the device will not function properly and continuous operation at the maximum allowable rating may affect the reliability of the device. All voltage reference points are ground.



Parameter	Symbol	Test condition	Minimum	Typical case	Maximum	Unit
supply current						
Supply current	Icc	DI=0 or VCC		240	400	μA
ESD protect						
A、B、Y、Z		Mannequin (HBM)		±16		kV
Other ports		Mannequin (HBM)		±6		kV
Drive switch characteristics						
Drive input to output propagation delay(low to high)	tDPLH	RDIFF=54 Ω, CL1=CL2=100pF (see Figure 3 and Figure 4)		15	35	ns
Drive input to output propagation delay(high to low)	tDPHL			15	35	ns
tDPLH-tDPHL	tSKEW1			7	10	ns
Rise time /fall time	tDR,tDF			10	25	ns
Acceptor The propagation delay from input to output is from low to high	tRPLH	See Figure 5 and Figure 6 VID 2.0V; The rise and fall time VID is less than 15ns	20	60	90	ns
Acceptor The propagation delay from input to output is from high to low	tRPHL		20	60	90	ns
tRPLH-tRPHL	tSKEW2			7	10	ns
DC electrical characteristics of the driver						
High-level input	VIH	DI	2.0			V
Low level input	VIL	DI			0.8	V
Logic input current	IIN1	DI	-2		2	μA
Differential output of the driver(non-loaded)	VoD1			5		V
Drive differential output	VoD2	Graph 2,RL=27Ω	1.5		VCC	V
		Graph 2,RL=50Ω	2		VCC	
The current output is short-circuited to high	IosD1	Short circuit to 0V~12V	35		250	mA
The current output is short-circuited to low	IosD2	Short circuit to -7V~0V	-250		-35	mA
Change in the amplitude of the output voltage (NOTE1)	△VoD	Graph 2,RL=27Ω			0.2	V
Output common mode voltage	Voc	Graph 2,RL=27Ω			3	V
Change in the amplitude of the common-mode output voltage(NOTE1)	△Voc	Graph 2,RL=27Ω			0.2	V

DC electrical characteristics of the receiver						
Parameter	Symbol	Test condition	Minimum	Typical case	Maximum	Unit
Positive input threshold voltage	VIT+	$-7V \leq V_{cM} \leq 12V$			+200	mV
Reverse input threshold voltage	VIT-	$7V \leq V_{cM} \leq 12V$	-200			mV
Enter the hysteresis voltage	V <sub>hys</sub>	$-7V \leq V_{CM} \leq 12V$	10	30		mV
Input current(A,B)	IIN2	VCC=0 or 3.3V VIN=12 V			125	µA
		VCC=0 or 3.3V VIN =-7 V	-100			µA
Three state input leakage current	I <sub>ozR</sub>	$0.4V < V_o < 2.4V$			±1	µA
Receiver input resistance	R <sub>IN</sub>	$-7V \leq V_{cM} \leq 12V$	96			kΩ
Receiver short circuit current	I <sub>osR</sub>	$0V \leq V_o \leq VCC$	±7		±95	mA
High level output voltage	V <sub>oH</sub>	$I_{oUT}=-4mA$ , $V_{ID}=+200 mV$	VCC-1.5			V
Low level output voltage	V <sub>oL</sub>	$I_{oUT}=+4mA$ , $V_{ID}=-200 mV$			0.4	V

(If not otherwise specified,  $V_{CC} = 3.3V \pm 10\%$ ,  $Temp = T_{MIN} \sim T_{MAX}$ , typical value is  $V_{CC} = +3.3V$ ,  $Temp = 25^\circ C$ )

## Test Circuit

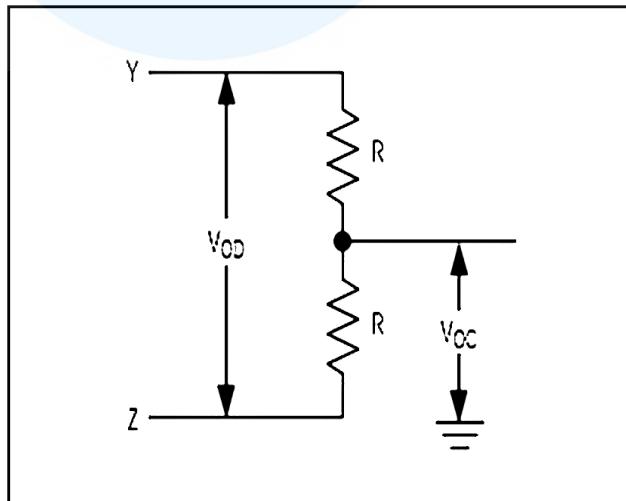


Figure 2 DC test load of the driver

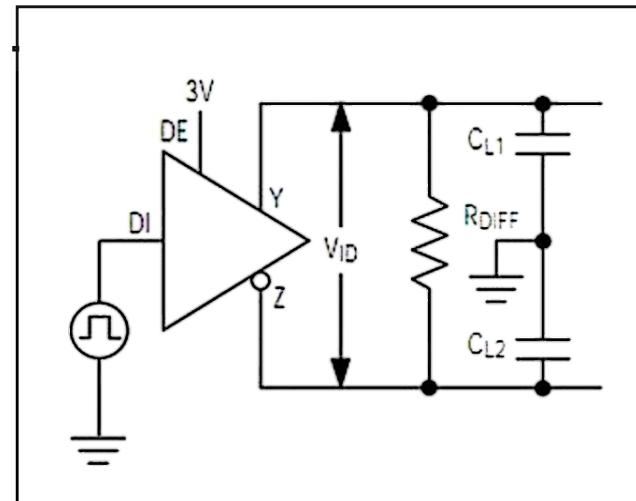


Figure 3 Driver timing test circuit

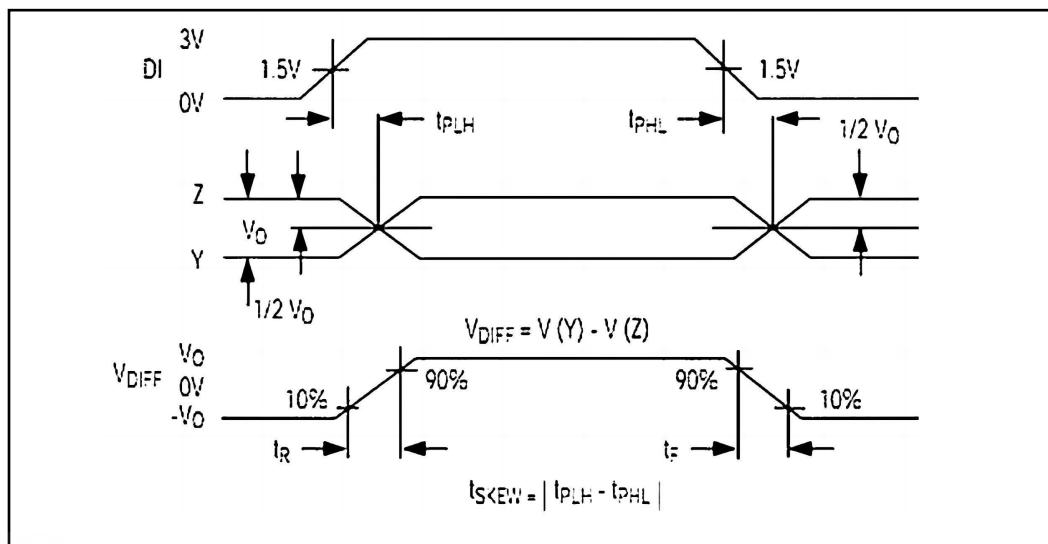


Figure 4 Driver propagation delay

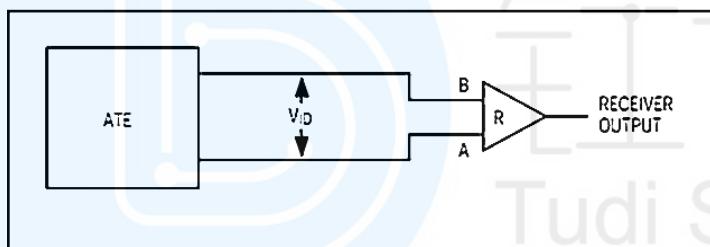


Figure 5 Receiver propagation delay test circuit

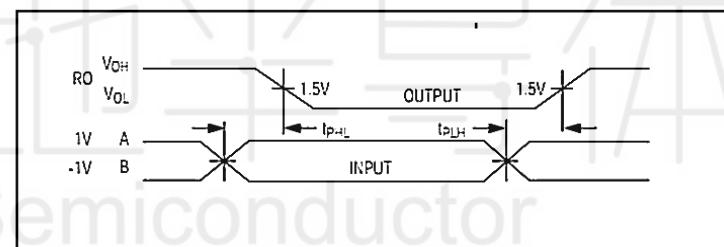


Figure 6 Receiver propagation delay timing

## Additional description

### resume

The 3081 is a full-duplex, high-speed transceiver for RS-485/RS-422 communication, incorporating driver and a receiver. It features fail-safe, overvoltage protection, and overcurrent protection. The 3081 achieves error-free data transmission up to 115kbps.

### The bus is connected to 256 transceivers

The input impedance of the standard RS485 receiver is 12k (1 unit load), and the standard driver can drive up to 256 unit loads. The receiver of the 3081 transceiver has an input impedance of 1/8 unit load (96k), allowing up 256 transceivers to be connected in parallel on the same communication bus. These devices can be combined arbitrarily, or combined with other RS485 transceivers as long as the total load does not exceed 256 unit loads, they can be connected to the same bus.

### Drive output protection

Protection against excessive output current and dissipation by fault or bus contention is provided by overcurrent and overvoltage protection mechanisms, with fast short-circuit protection throughout the common-mode voltage range (see Typical Operating Characteristics).



## Function table

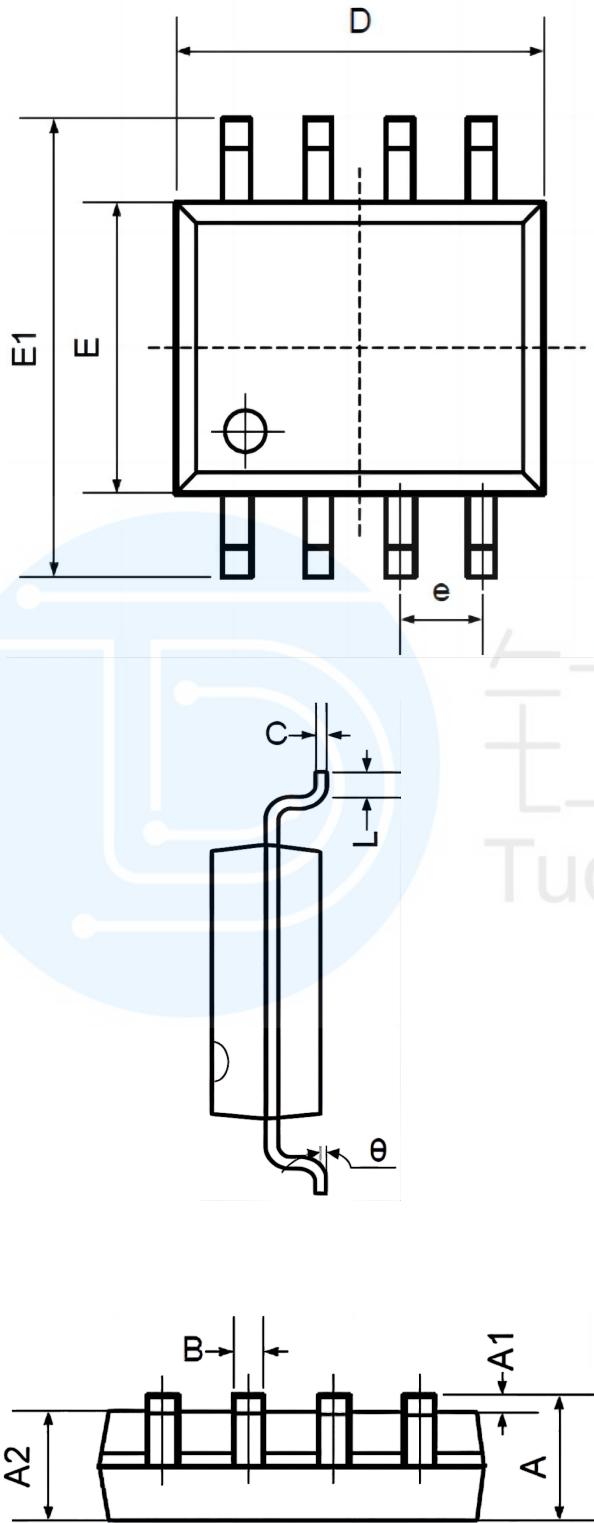
Send function table					Receiving function table			
input	A-B	$\geq +200\text{mV}$	$\leq -200\text{mV}$	Open/short circuit	input	DI	1	0
output	RO	H	L	H	Y	H	L	
					Z	L	H	

## Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
MAX3081ECSA-TUDI	SOP8	Tape,Reel,2500	MAX3081ECSA	0°C to 70°C
MAX3081ECPA-TUDI	DIP8	Tube,50A box of 2000	MAX3081ECPA	
MAX3081EESA-TUDI	SOP8	Tape,Reel,2500	MAX3081EESA	- 40°C to 85°C
MAX3081EEPA-TUDI	DIP8	Tube,50A box of 2000	MAX3081EEPA	



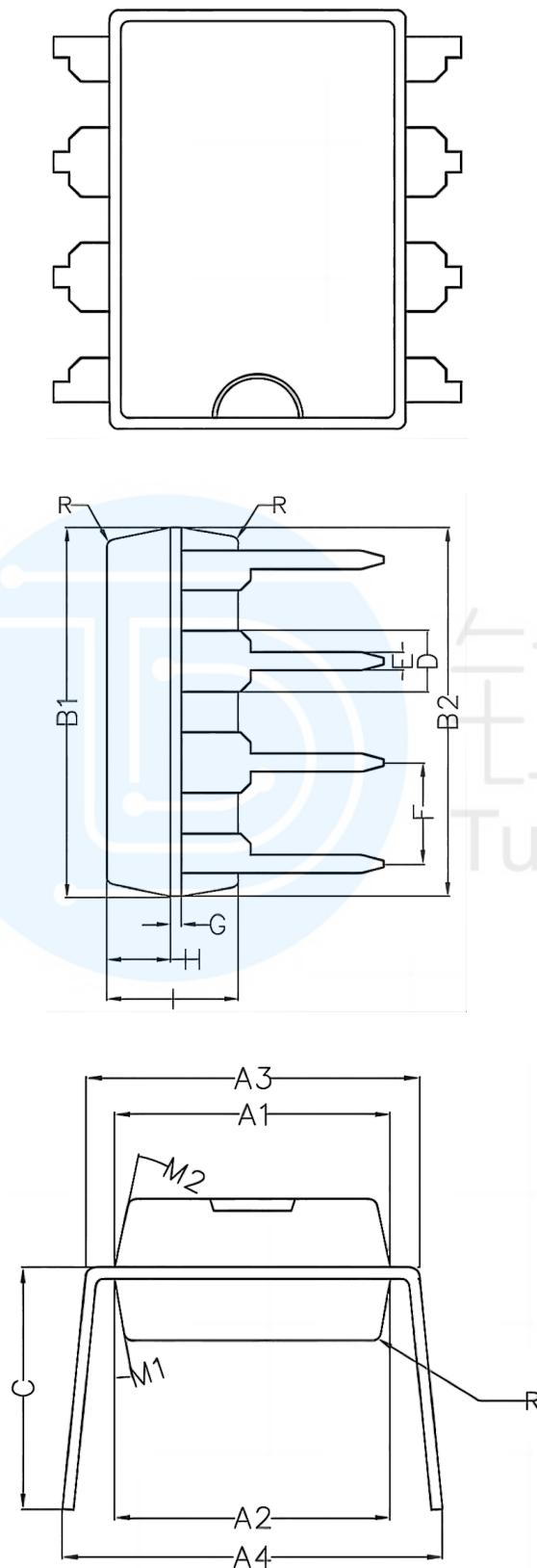
## Package SOP8



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°



## Package DIP8



Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25
B2	9.20	9.25	9.30
C		5.57	
D		1.52	
E	0.43	0.45	0.47
F		2.54	
G		0.25	
H	1.54	1.59	1.64
工	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°



## Important statement:

- TUDI Semiconductor reserves the right to modify the product manual without prior notice! Before placing an order, customers need to confirm whether the obtained information is the latest version and verify the completeness of the relevant information.
- Any semi-guide product is subject to failure or malfunction under specified conditions. It is the buyer's responsibility to comply with safety standards when using TUDI Semiconductor products for system design and whole machine manufacturing. And take the appropriate safety measures to avoid the potential risk of loss of personal injury or loss of property situation!
- TUDI Semiconductor products have not been licensed for life support, military, and aerospace applications, and therefore TUDI Semiconductor is not responsible for any consequences arising from the use of this product in these areas.
- If any or all TUDI Semiconductor products (including technical data, services) described or contained in this document are subject to any applicable local export control laws and regulations, they may not be exported without an export license from the relevant authorities in accordance with such laws.
- The specifications of any and all TUDI Semiconductor products described or contained in this document specify the performance, characteristics, and functionality of said products in their standalone state, but do not guarantee the performance, characteristics, and functionality of said products installed in Customer's products or equipment. In order to verify symptoms and conditions that cannot be evaluated in a standalone device, the Customer should ultimately evaluate and test the device installed in the Customer's product device.
- TUDI Semiconductor documentation is only allowed to be copied without any alteration of the content and with the relevant authorization. TUDI Semiconductor assumes no responsibility or liability for altered documents.
- TUDI Semiconductor is committed to becoming the preferred semiconductor brand for customers, and TUDI Semiconductor will strive to provide customers with better performance and better quality products.