

Low-Power, Slew-Rate-Limited RS-485/RS-422 Transceivers

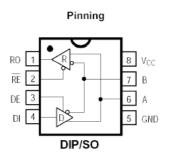
General Description

The ADM485 is low-power transceivers for RS-485 and RS-422 communication. IC contains one driver and one receiver. The driver slew rates of the ADM485 is not limited, allowing them to transmit up to 2.5Mbps.

These transceivers draw between 120μ A and 500μ A of supply current when unloaded or fully loaded with disabled drivers. All parts operate from a single 5V supply. Drivers are short-circuit current limited and are protected against excessive power dissipation by thermal shutdown circuitry that places the driver outputs into a high-impedance state. The receiver input has a fail-safe feature that guarantees a logic-high output if the input is open circuit. The ADM485 is designed for half-duplex applications.

Features

- Low Quiescent Current: 300µA
- -7V to +12V Common-Mode Input Voltage Range
- Three-State Outputs
- 30ns Propagation Delays, 5ns Skew
- Full-Duplex and Half-Duplex Versions Available
- Operate from a Single 5V Supply
- Allows up to 32 Transceivers on the Bus
- Data rate: 2,5 Mbps
- Current-Limiting and Thermal Shutdown for Driver Overload Protection



ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) 12V Control Input Voltage -0.5V to (V_{CC} + 0.5V)

Driver Input Voltage (DI) -0.5V to (V_{CC}+ 0.5V)

Driver Output Voltage (A, B) -8V to +12.5V Receiver Input Voltage (A, B) -8V to +12.5V Receiver Output Voltage (RO) -0.5V to $(V_{CC}+0.5V)$ Continuous Power Dissipation (T_A= +70°C) 8-Pin Plastic DIP (derate 9.09mW/°C above +70°C) 727mW

8-Pin SO (derate 5.88mW/°C above +70°C) 471mW

Operating Temperature Ranges-40°C to +85°C Storage Temperature Range -65°C to +160°C Lead Temperature (soldering, 10sec) +300°C

DC ELECTRICAL CHARACTERISTICS

 $(V_{CC} = 5V \pm 5\%, T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.) (Notes 1, 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Differential Driver Output (no load)	Vod1				5	V	
Differential Driver Output	Vod2	R = 50Ω (RS-422)		2			V
(with load)		R = 27Ω (RS-485), F	igure 4	1.5		5	
Change in Magnitude of Driver Differential Output Voltage for Complementary Output States	ΔVod	$R = 27\Omega$ or 50Ω , Figu			0.2	V	
Driver Common-Mode Output Voltage	Voc	$R = 27\Omega \text{ or } 50\Omega$, Figu			3	V	
Change in Magnitude of Driver Common-Mode Output Voltage for Complementary Output States	ΔVod	R = 27Ω or 50Ω, Figure 4				0.2	V
Input High Voltage	Vін	DE, DI, RE		2.0			V
Input Low Voltage	VIL	DE, DI, RE				0.8	V
Input Current	lin1	DE, DI, RE				±2	μA
Input Current	IN2	DE = 0V; VIN = 12V				1.0	mA
(A, B)		$V_{CC} = 0V \text{ or } 5.25V, V_{IN} = -7V$				-0.8	
Receiver Differential Threshold Voltage	Vтн	-7V ≤ V _{CM} ≤12V		-0.2		0.2	V
Receiver Input Hysteresis	ΔV th	Vcm = 0V			70		mV
Receiver Output High Voltage	Vон	lo = -4mA, VID = 200mV		3.5			V
Receiver Output Low Voltage	Vol	Io = 4mA, VID = -200mV				0.4	V
Three-State (high impedance) Output Current at Receiver	lozr	$0.4V \leq V_0 \leq 2.4V$				±1	μA
Receiver Input Resistance	Rin	$-7V \le V_{CM} \le 12V$					kΩ

DC ELECTRICAL CHARACTERISTICS (continued) (Vcc = 5V ±5%, T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Notes 1, 2)

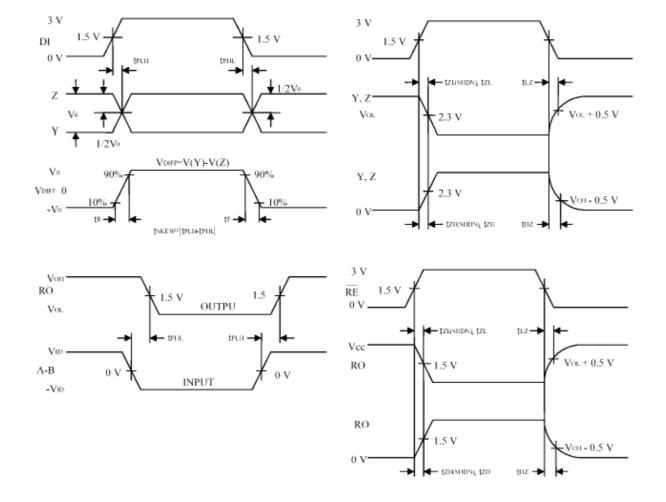
PARAMETER	SYMBOL	CONDITIONS	MIN	ТҮР	MAX	UNITS
No-Load Supply Current	lcc	DE = V _{CC}		500	900	
(Note 3)		RE = 0V or Vcc		300	500	μA
		DE = 0V				
Driver Short-Circuit Current,						
	losd1	$-7V \le V_0 \le 12V$ (Note 4)	35		250	mA
Vo= High						
Driver Short-Circuit Current,						
	losd2	-7V \leq Vo \leq 12V (Note 4)	35		250	mA
Vo = Low						
Receiver Short-Circuit Current	losr	$0V \le Vo \le Vcc$	7		95	mA

SWITCHING CHARACTERISTICS

(Vcc = 5V \pm 5%, T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Notes 1, 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Driver Input to Output	t PLH	RDIFF = 54∧	10	30	60	ns
	t PHL	$C_{L1} = C_{L2} = 100 pF$	10	30	60	
Driver Output Skew to Output	t skew	RDIFF = 54^, CL1 = CL2 = 100pF		5	10	ns
Driver Enable to Output High	tzн	C∟= 100pF, S2 closed		40	70	ns
Driver Enable to Output Low	tz∟	C∟= 100pF, S1 closed		40	70	ns
Driver Disable Time from Low	t∟z	C∟= 15pF, S1 closed		40	70	ns
Driver Disable Time from High	tнz	C∟= 15pF, S2 closed		40	70	ns
tPLH - tPHL Differential	t skd	Rdiff = 54∧		13		ns
Receiver Skew		$C_{L1} = C_{L2} = 100 pF$				
Receiver Enable to Output Low	tzı	C _{RL} = 15pF, S1 closed		20	50	ns
Receiver Enable to Output High	tzн	C _{RL} = 15pF, S2 closed		20	50	ns
Receiver Disable Time from Low	t∟z	C _{RL} = 15pF, S1 closed		20	50	ns
Receiver Disable Time from High	tнz	C _{RL} = 15pF, S2 closed		20	50	ns
Maximum Data Rate	fмах		2.5			Mbps



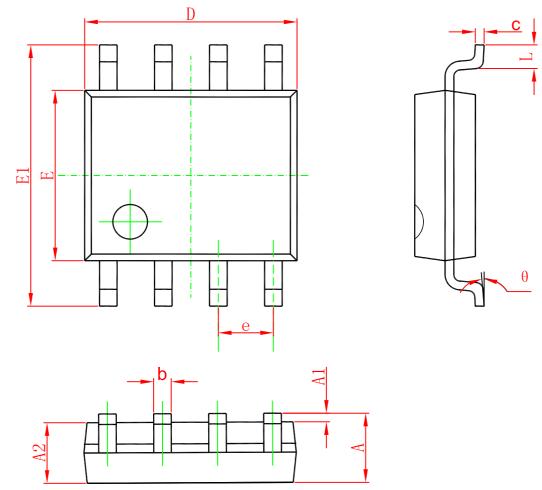


Operation timing diagrams of ADM485

Table of ADM485 operation

Transmission				Receipt				
	Inputs		Outp	Outputs X Inp		Inputs Out		Outputs
RE	DE	DI	Z	Y	RE	DE	A-B	RO
Х	1	1	0	1	0	0	+0.2V	1
Х	1	0	1	0	0	0	-0.2V	0
0	0	Х	Z	Z	0	0	open	1
1	0	Х	Z	Z	1	0	Х	Z

X-don't care Z-high resistance SOP-8



Symbol	Dimensions In	Millimeters	Dimensions In Inches		
Symbol	Min	Max	Min	Max	
А	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	
С	0.170	0.250	0.006	0.010	
D	4.700	5.100	0.185	0.200	
E	3.800	4.000	0.150	0.157	
E1	5.800	6.200	0.228	0.244	
е	1.270(BSC)		0.050)(BSC)	
L	0.400	1.270	0.016	0.050	
θ	0°	8°	0°	8°	



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW ADM485ARZ	SOP-8	2500	Tape and reel