钍地半导体
Tudi Semiconductor

Product Specification

TUDI-LTC485

Low Power RS485 Interface Transceiver

网址 www.sztdbdt.com

用芯智造·卓越品质

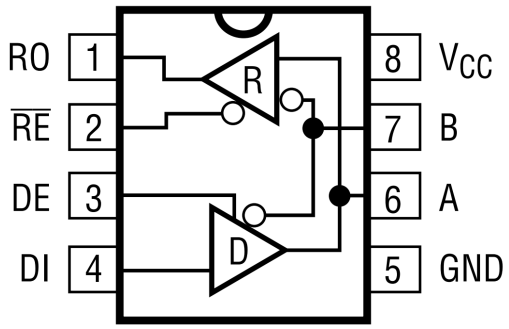
semiconductor device manufacturer

- Design
- research and development
- production
- and sales

FEATURES

- Low Power: ICC = 300μA Typ
- Designed for RS485 Interface Applications
- Single 5V Supply
- –7V to 12V Bus Common Mode Range Permits ±7V Ground Difference Between Devices on the Bus
- Thermal Shutdown Protection
- Power-Up/Down Glitch-Free Driver Outputs Permit Live Insertion or Removal of Transceiver
- Driver Maintains High Impedance in Three-State or with the Power Off
- Combined Impedance of a Driver Output and Receiver Allows Up to 32 Transceivers on the Bus
- 70mV Typical Input Hysteresis
- 30ns Typical Driver Propagation Delays with 5ns Skew for Up to 2.5MB Operation
- Pin Compatible with ±60V Protected LTC2862

TOP VIEW



N8 PACKAGE
8-LEAD PLASTIC DIP

S8 PACKAGE
8-LEAD PLASTIC SOIC

J8 PACKAGE
8-LEAD CERAMIC DIP
OBSOLETE PACKAGE

T_{JMAX} = 125°C, θ_{JA} = 100°C/W (N)
T_{JMAX} = 150°C, θ_{JA} = 150°C/W (S)
T_{JMAX} = 155°C, θ_{JA} = 100°C/W (J)

APPLICATIONS

- Low Power RS485/RS422 Transceiver
- Level Translator

DESCRIPTION

The LTC 485 is a low power differential bus/line trans-ceiver designed for multipoint data transmission standard RS485 applications with extended common mode range (12V to –7V). It also meets the requirements of RS422.
The CMOS design offers significant power savings over its bipolar counterpart without sacrificing ruggedness against overload or ESD damage.
The driver and receiver feature three-state outputs, with the driver outputs maintaining high impedance over the entire common mode range. Excessive power dissipa-tion caused by bus contention or faults is prevented by a thermal shutdown circuit which forces the driver outputs into a high impedance state.
The receiver has a fail-safe feature which guarantees a high output state when the inputs are left open.
The LTC485 is fully specified over the commercial and extended industrial temperature range.

PIN FUNCTIONS

RO (Pin 1): Receiver Output. If the receiver output is enabled ($\overline{RE}$ low), then if A > B by 200mV, RO will be high. If A < B by 200mV, then RO will be low.

$\overline{RE}$ (Pin 2): Receiver Output Enable. A low enables the receiver output, RO. A high input forces the receiver output into a high impedance state.

DE (Pin 3): Driver Output Enable. A high on DE enables the driver outputs, A and B, and the chip will function as a line driver. A low input will force the driver outputs into a high impedance state and the chip will function as a line receiver.

DI (Pin 4): Driver Input. If the driver outputs are enabled (DE high), then a low on DI forces the outputs A low and B high. A high on DI with the driver outputs enabled will force A high and B low.

GND (Pin 5): Ground Connection.

A (Pin 6): Driver Output/Receiver Input.

B (Pin 7): Driver Output/Receiver Input.

V_{CC} (Pin 8): Positive Supply; 4.75 < V_{CC} < 5.25.

ABSOLUTE MAXIMUM RATINGS

(Note 1)

Supply Voltage 12V
Control Input Voltages ..... –0.5V to V_{CC} + 0.5V
Driver Input Voltage ..... –0.5V to V_{CC} + 0.5V
Driver Output Voltage ..... ±14V
Receiver Input Voltage ..... ±14V
Receiver Output Voltages ..... –0.5V to V_{CC} + 0.5V
Operating Temperature Range
LTC485I ..... –40°C ≤ T_A ≤ 85°C
LTC485C ..... 0°C ≤ T_A ≤ 70°C
LTC485M **(OBSOLETE)** ..... –55°C ≤ T_A ≤ 125°C
Lead Temperature (Soldering, 10 sec) ..... 300°C
Storage Temperature Range ..... –65°C to 150°C

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. V_{CC} = 5V ±5%, unless otherwise noted. (Notes 2 and 3)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{OD1}	Differential Driver Output Voltage (Unloaded)	I_O = 0	●		5		V
V_{OD2}	Differential Driver Output Voltage (with Load)	R = 50Ω (RS422) R = 27Ω (RS485), Figure 1	● ●	2 1.5		 5	V V
ΔV_{OD}	Change in Magnitude of Driver Differential Output Voltage for Complementary States	R = 27Ω or R = 50Ω, Figure 1	●			0.2	V
V_{OC}	Driver Common Mode Output Voltage	R = 27Ω or R = 50Ω, Figure 1	●			3	V
$\Delta\lvert V_{OC}\rvert$	Change in Magnitude of Driver Common Mode Output Voltage for Complementary States	R = 27Ω or R = 50Ω, Figure 1	●			0.2	V

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. V_{CC} = 5V ±5%, unless otherwise noted. (Notes 2 and 3)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{IH}	Input High Voltage	DE, DI, $\overline{RE}$	●	2			V
V_{IL}	Input Low Voltage	DE, DI, $\overline{RE}$	●			0.8	V
I_{IN1}	Input Current	DE, DI, $\overline{RE}$	●			±2	µA
I_{IN2}	Input Current (A, B)	DE = 0, V_{CC} = 0V or 5.25V V_{IN} = 12V C-, I-Grade V_{IN} = –7V	● ●			1 –0.8	mA mA
		M-Grade V_{IN} = 12V V_{IN} = –7V	● ●			2 –1.6	mA mA
V_{TH}	Differential Input Threshold Voltage for Receiver	–7V ≤ V_{CM} ≤ 12V	●	–0.2		0.2	V
ΔV_{TH}	Receiver Input Hysteresis	V_{CM} = 0V	●		70		mV
V_{OH}	Receiver Output High Voltage	I_O = –4mA, V_{ID} = 200mV	●	3.5			V
V_{OL}	Receiver Output Low Voltage	I_O = 4mA, V_{ID} = –200mV	●			0.4	V
I_{OZR}	Three-State (High Impedance) Output Current at Receiver	V_{CC} = Max, 0.4V ≤ V_O ≤ 2.4V	●			±1	µA
R_{IN}	Receiver Input Resistance	–7V ≤ V_{CM} ≤ 12V (C-, I-Grade) (M-Grade)	● ●	12 6			kΩ kΩ

SWITCHING CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. V_{CC} = 5V ±5%, unless otherwise noted. (Notes 2 and 3)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
I_{CC}	Supply Current	No Load, Pins 2, 3, 4 = 0V or 5V Outputs Enabled Outputs Disabled	● ●		500 300	900 500	µA µA
I_{OSD1}	Driver Short-Circuit Current, V_{OUT} = HIGH	V_O = – 7V	●	35	100	250	mA
I_{OSD2}	Driver Short-Circuit Current, V_{OUT} = LOW	V_O = 10V	●	35	100	250	mA
I_{OSR}	Receiver Short-Circuit Current	0V ≤ V_O ≤ V_{CC}	●	7		85	mA
t_{PLH}	Driver Input to Output	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF, (Figures 3 and 5)	●	10	30	50	ns
t_{PHL}	Driver Input to Output		●	10	30	50	ns
t_{SKEW}	Driver Output to Output		●		5	10	ns
t_r, t_f	Driver Rise or Fall Time		●	3	15	25	ns
t_{ZH}	Driver Enable to Output High	C_L = 100pF (Figures 4 and 6) S2 Closed	●		40	70	ns
t_{ZL}	Driver Enable to Output Low	C_L = 100pF (Figures 4 and 6) S1 Closed	●		40	70	ns
t_{LZ}	Driver Disable Time from Low	C_L = 15pF (Figures 4 and 6) S1 Closed	●		40	70	ns
t_{HZ}	Driver Disable Time from High	C_L = 15pF (Figures 4 and 6) S2 Closed	●		40	70	ns
t_{PLH}	Receiver Input to Output	R_{DIFF} = 54Ω, CL1 = CL2 = 100pF, (Figures 3 and 7)	●	30	90	200	ns
t_{PHL}			●	30	90	200	ns
t_{SKD}	$\lvert t_{PLH} - t_{PHL} \rvert$ Differential Receiver Skew		●		13		ns
t_{ZL}	Receiver Enable to Output Low	C_{RL} = 15pF (Figures 2 and 8) S1 Closed	●		20	50	ns
t_{ZH}	Receiver Enable to Output High	C_{RL} = 15pF (Figures 2 and 8) S2 Closed	●		20	50	ns
t_{LZ}	Receiver Disable from Low	C_{RL} = 15pF (Figures 2 and 8) S1 Closed	●		20	50	ns
t_{HZ}	Receiver Disable from High	C_{RL} = 15pF (Figures 2 and 8) S2 Closed	●		20	50	ns

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

Note 2: All currents into device pins are positive; all currents out of device pins are negative. All voltages are referenced to device ground unless otherwise specified.

Note 3: All typicals are given for V_{CC} = 5V and T_A = 25°C.

Note 4: The LTC485 is guaranteed by design to be functional over a supply voltage range of 5V ±10%. Data sheet parameters are guaranteed over the tested supply voltage range of 5V ±5%.

TEST CIRCUITS

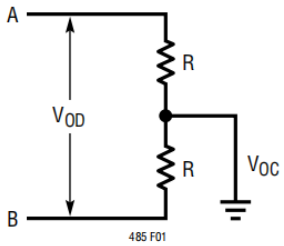


Figure 1. Driver DC Test Load

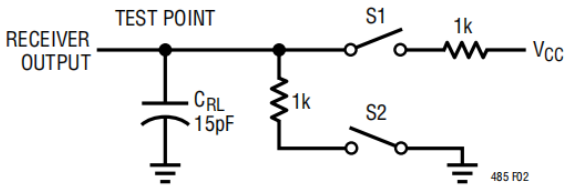


Figure 2. Receiver Timing Test Load

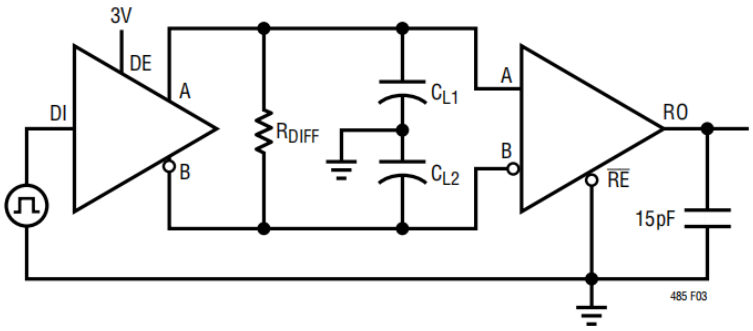


Figure 3. Driver/Receiver Timing Test Circuit

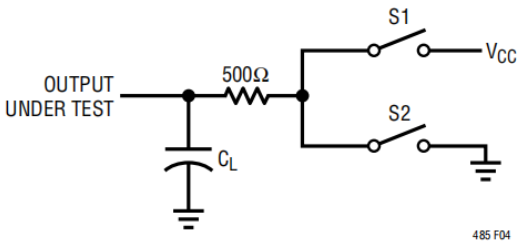


Figure 4. Driver Timing Test Load #2

SWITCHING TIME WAVEFORMS

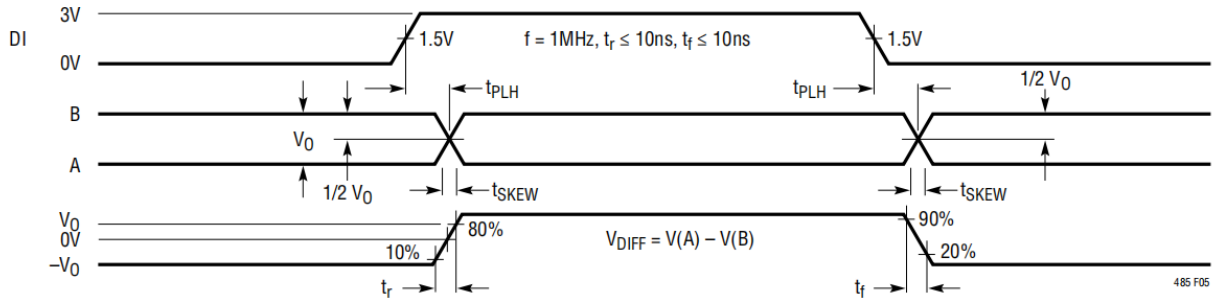


Figure 5. Driver Propagation Delays

SWITCHING TIME WAVEFORMS

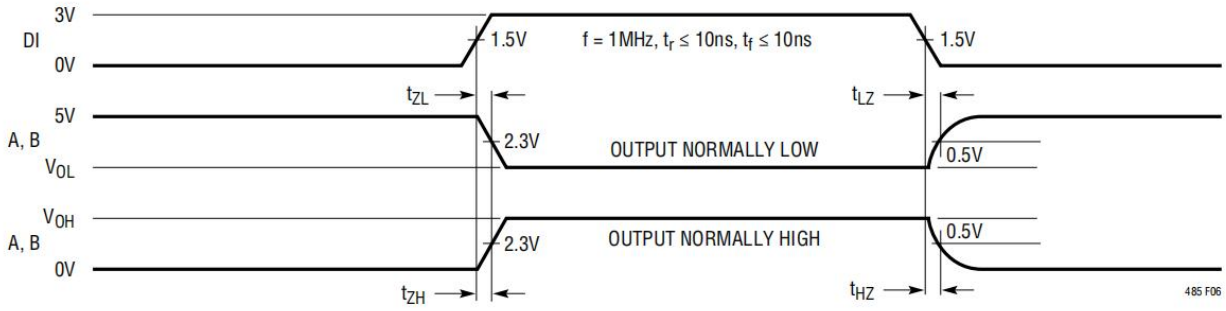


Figure 6. Driver Enable and Disable Times

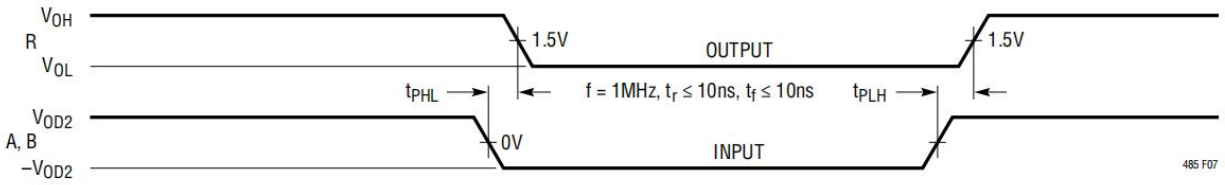


Figure 7. Receiver Propagation Delays

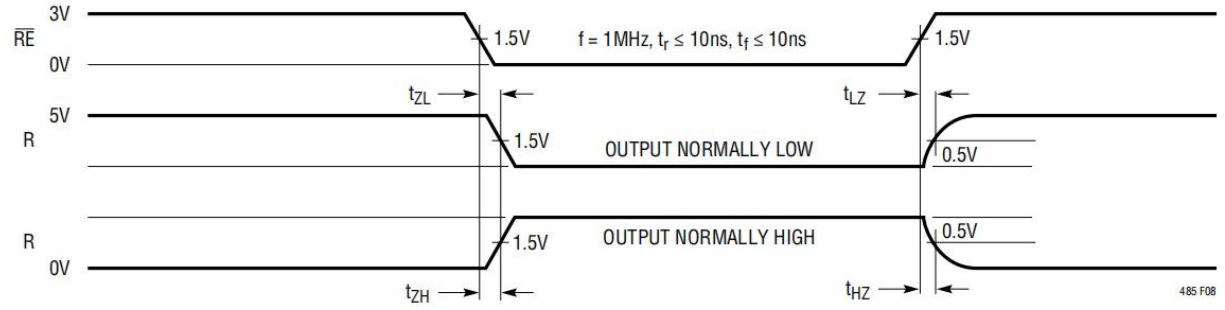


Figure 8. Receiver Enable and Disable Times

FUNCTION TABLES

LTC485 Transmitting

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

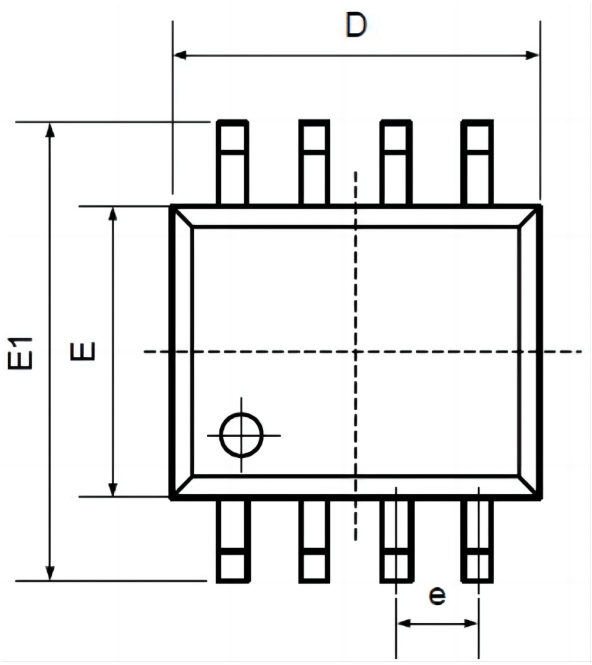
LTC485 Receiving

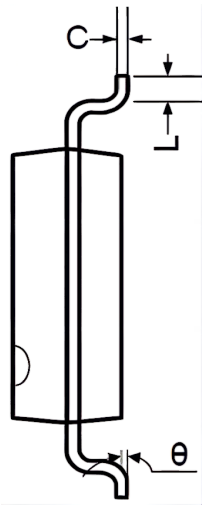
INPUTS			OUTPUTS
$\overline{RE}$	DE	A – B	R
0	0	≥ 0.2V	1
0	0	≤ –0.2V	0
0	0	Inputs Open	1
1	0	X	Z

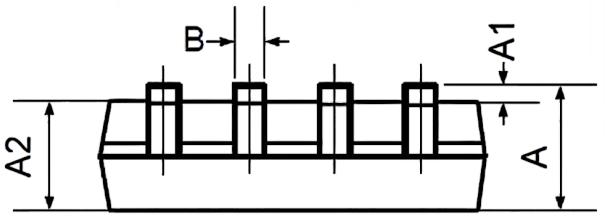
ORDERING INFORMATION

Order Number	Package	Package Quantity	Marking On The park
LTC485CN8-TUDI	DIP8	Tube,50,A box of 2000	LTC485CN8
LTC485CS8-TUDI	SOP8	Tape,Reel,2500	485
LTC485IN8-TUDI	DIP8	Tube,50,A box of 2000	LTC485IN8
LTC485IS8-TUDI	SOP8	Tape,Reel,2500	485I

Package SOP8

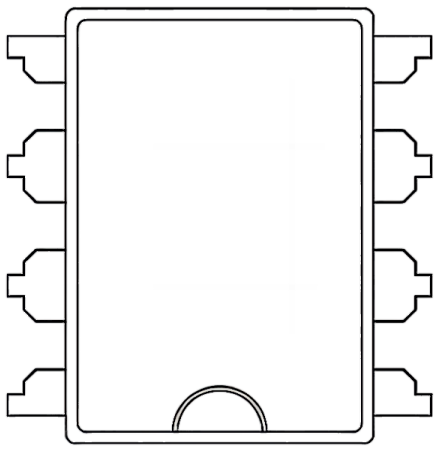


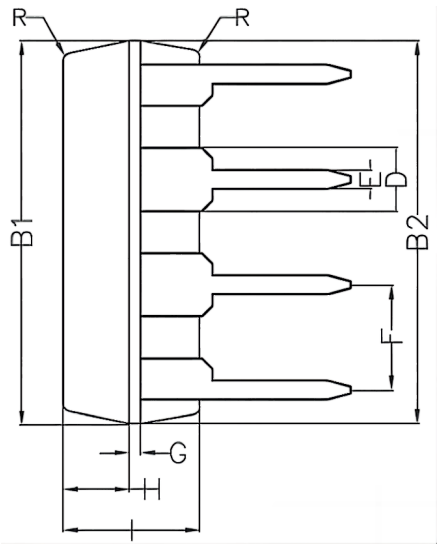


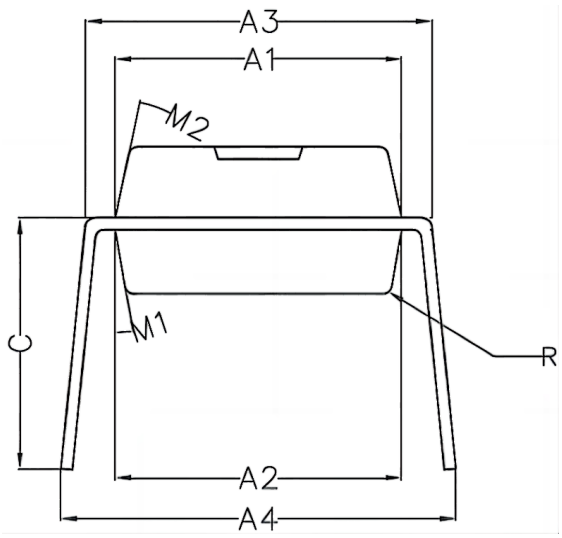


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP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

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