钍地半导体
Tudi Semiconductor

Product Specification

TUDI-LTC1485

Differential Bus Transceiver

网址 www.sztdbdt.com

用芯智造·卓越品质

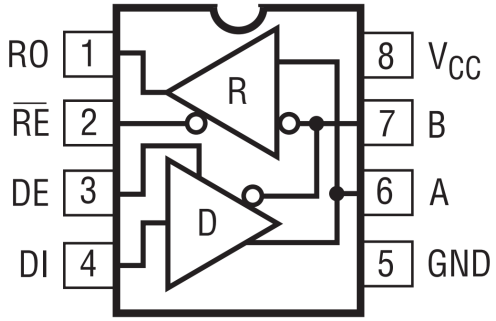
semiconductor device manufacturer

- Design
- research and development
- production
- and sales

FEATURES

- ESD Protection Over ±10kV
- Low Power: ICC = 1.8mA Typ
- 28ns Typical Driver Propagation Delays with 4ns Skew
- Designed for RS485 or RS422 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
- 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
- 60mV Typical Input Hysteresis
- Pin-Compatible with the SN75176A, DS75176A, and SN75LBC176

TOP VIEW



N8 PACKAGE
8-LEAD PLASTIC DIP

S8 PACKAGE
8-LEAD PLASTIC SOIC

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

APPLICATIONS

- Low Power RS485/RS422 Transceiver
- Level Translator

DESCRIPTION

The LTC®1485 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 with Schottky 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. I/O pins are protected against multiple ESD strikes of over ±10kV.

The receiver has a fail-safe feature which guarantees a high output state when the inputs are left open.

Both AC and DC specifications are guaranteed from –40 ° C to 85 ° C and 4.75V to 5.25V supply voltage 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. A low input will force the driver outputs into a high impedance state.

DI (Pin 4): Driver Input. If the driver outputs are enabled (DE high), then a low on DI forces the driver outputs A low and B high. A high on DI 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. 4.75V ≤ V_{CC} ≤ 5.25V.

ABSOLUTE MAXIMUM RATINGS

(Note 1)

Supply Voltage (V_{CC}) 12V
Control Input Voltages ..... –0.5V to V_{CC} + 0.5V
Control Input Currents ..... –50mA to 50mA
Driver Input Voltages ..... –0.5V to V_{CC} + 0.5V
Driver Input Currents ..... –25mA to 25mA
Driver Output Voltages..... ±14V
Receiver Input Voltages ..... ±14V
Receiver Output Voltages ..... –0.5V to V_{CC} + 0.5V
Operating Temperature Range
  LTC1485C ..... 0°C to 70°C
  LTC1485I ..... –40°C to 85°C
Storage Temperature Range ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec.) ..... 300°C

DC 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 (Notes 2, 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 Output 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
$\Delta\|V_{OC}\|$	Change in Magnitude of Driver Common-Mode Output Voltage for Complementary Output States	R = 27Ω or R = 50Ω (Figure 1)	●			0.2	V
V_{INH}	Input High Voltage	DI, DE, $\overline{RE}$	●	2.0			V
V_{INL}	Input Low Voltage	DI, DE, $\overline{RE}$	●			0.8	V
I_{IN1}	Input Current	DI, DE, $\overline{RE}$	●			±2	µA
I_{IN2}	Input Current (A, B)	V_{CC} = 0V or 5.25V, V_{IN} = 12V V_{CC} = 0V or 5.25V, V_{IN} = –7V	● ●			1.0 –0.8	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	●		60		mV
V_{OH}	Receiver Output High Voltage	I_O = –4mA, V_{ID} = 0.2V	●	3.5			V
V_{OL}	Receiver Output Low Voltage	I_O = 4mA, V_{ID} = –0.2V	●			0.4	V
I_{OZR}	Three-State Output Current at Receiver	V_{CC} = Max 0.4V ≤ V_O ≤ 2.4V	●			±1	µA
I_{CC}	Supply Current	No Load; DI = GND or V_{CC} Outputs Enabled Outputs Disabled	 ● ●		 1.8 1.7	 2.3 2.3	 mA mA
R_{IN}	Receiver Input Resistance	–7V ≤ V_{CM} ≤ 12V	●	12			kΩ
I_{OSD1}	Driver Short-Circuit Current, V_{OUT} = High	V_O = –7V	●			250	mA
I_{OSD2}	Driver Short-Circuit Current, V_{OUT} = Low	V_O = 10 V	●			250	mA
I_{OSR}	Receiver Short-Circuit Current	0V ≤ V_O ≤ V_{CC}	●	7		85	mA

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 (Notes 2, 3).

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
t_{PLH}	Driver Input to Output	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF (Figures 2, 5)	●	10	30	50	ns
t_{PHL}	Driver Input to Output	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF (Figures 2, 5)	●	10	30	50	ns
t_{SKEW}	Driver Output to Output	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF (Figures 2, 5)	●		4	10	ns
t_r, t_f	Driver Rise or Fall Time	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF (Figures 2, 5)	●	5	15	25	ns
t_{ZH}	Driver Enable to Output High	C_L = 100pF (Figures 4, 6) S2 Closed	●		40	70	ns
t_{ZL}	Driver Enable to Output Low	C_L = 100pF (Figures 4, 6) S1 Closed	●		40	70	ns
t_{LZ}	Driver Disable Time from Low	C_L = 15pF (Figures 4, 6) S1 Closed	●		40	70	ns
t_{HZ}	Driver Disable Time from High	C_L = 15pF (Figures 4, 6) S2 Closed	●		40	70	ns
t_{PLH}	Receiver Input to Output	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF (Figures 2, 7)	●	15	25	50	ns
t_{PHL}	Receiver Input to Output	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF (Figures 2, 7)	●	20	30	55	ns
t_{SKEW}	$\lvert t_{PLH} - t_{PHL} \rvert$ Differential Receiver Skew	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF (Figures 2, 7)	●		5	15	ns
t_{ZL}	Receiver Enable to Output Low	C_L = 15pF (Figures 3, 8) S1 Closed	●		30	45	ns
t_{ZH}	Receiver Enable to Output High	C_L = 15pF (Figures 3, 8) S2 Closed	●		30	45	ns
t_{LZ}	Receiver Disable from Low	C_L = 15pF (Figures 3, 8) S1 Closed	●		30	45	ns
t_{HZ}	Receiver Disable from High	C_L = 15pF (Figures 3, 8) S2 Closed	●		30	45	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.

TEST CIRCUIT

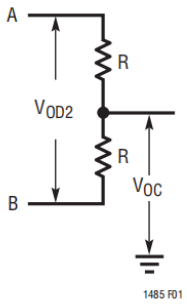


Figure 1. Driver DC Test Load

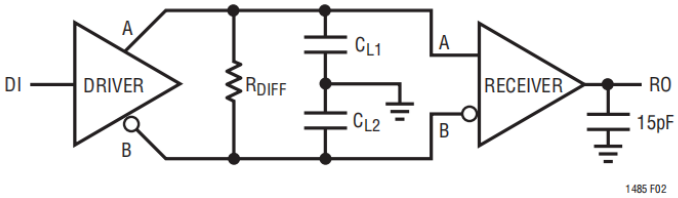


Figure 2. Driver/Receiver Timing Test Circuit

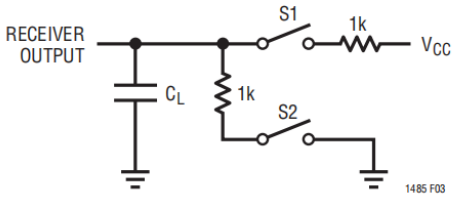


Figure 3. Receiver Timing Test Load

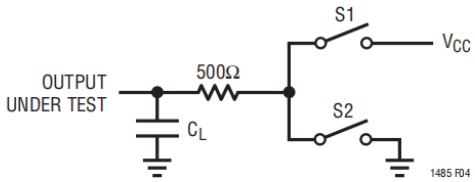


Figure 4. Driver Timing Test Load

SWITCHING TIME WAVEFORMS

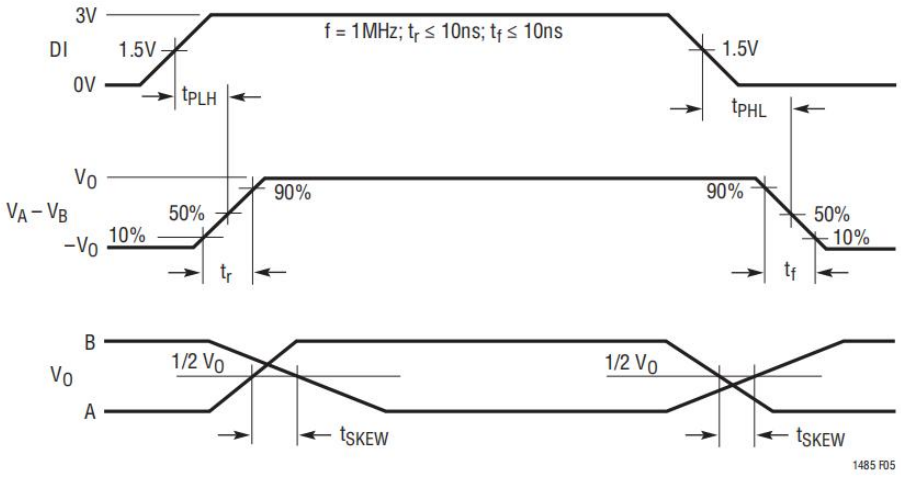


Figure 5. Driver Propagation Delays

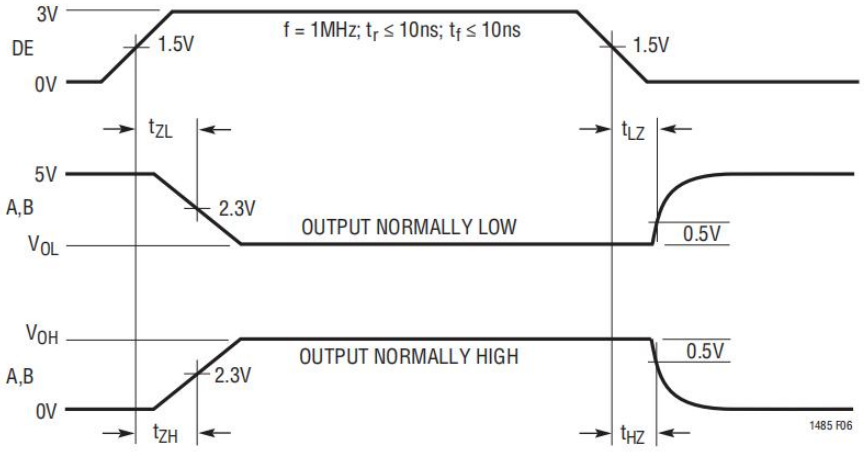


Figure 6. Driver Enable and Disable Times

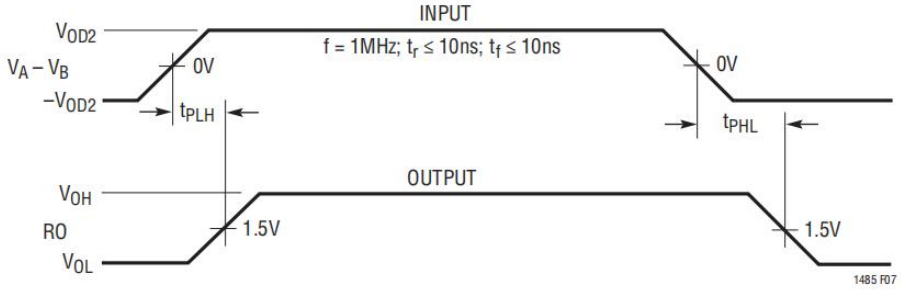


Figure 7. Receiver Propagation Delays

SWITCHING TIME WAVEFORMS

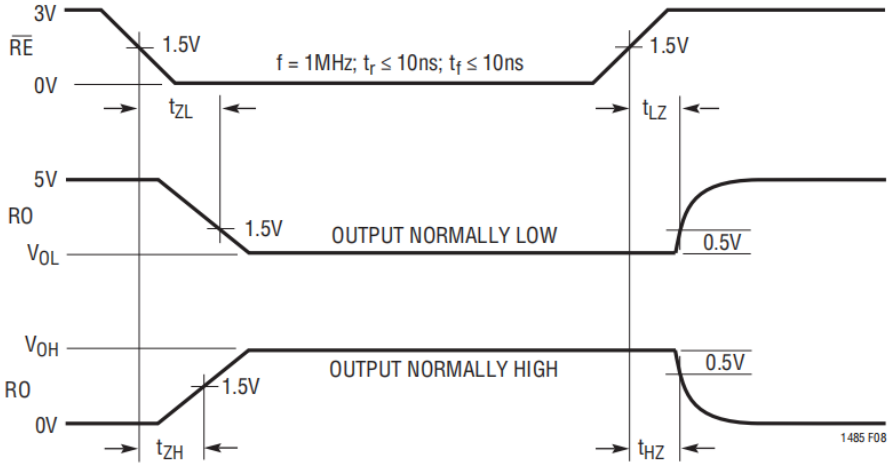
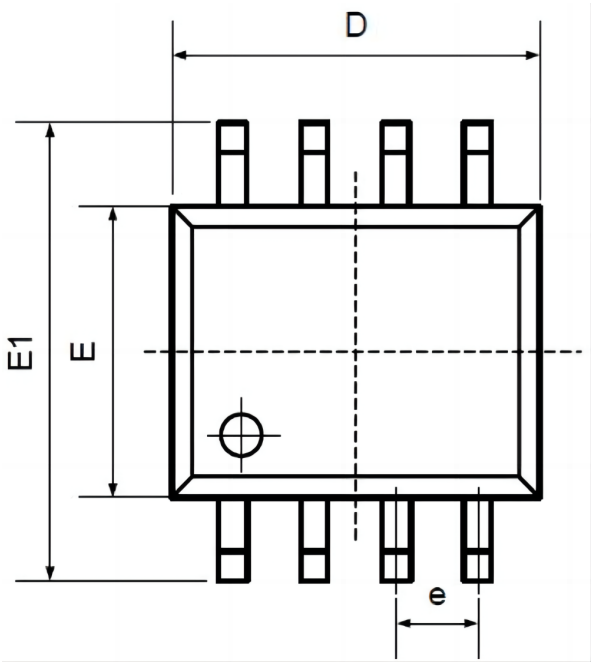


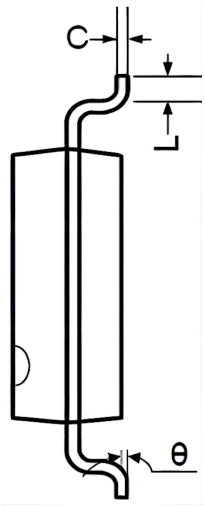
Figure 8. Receiver Enable and Disable Times

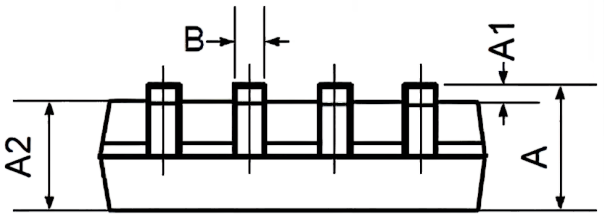
ORDERING INFORMATION

Order Number	Package	Package Quantity	Marking On The park
LTC1485CN8-TUDI	DIP8	Tube,50,A box of 2000	LTC1485CN8
LTC1485CS8-TUDI	SOP8	Tape,Reel,2500	1485
LTC1485IN8-TUDI	DIP8	Tube,50,A box of 2000	LTC1485IN8
LTC1485IS8-TUDI	SOP8	Tape,Reel,2500	1485I

Package SOP8

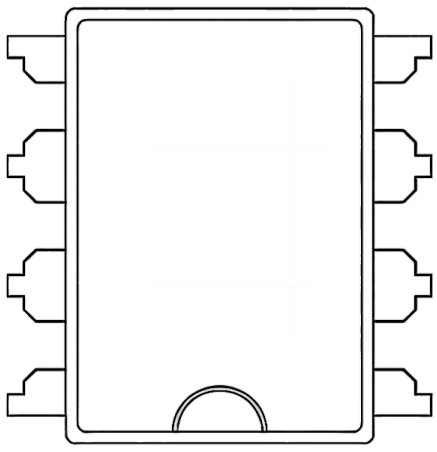


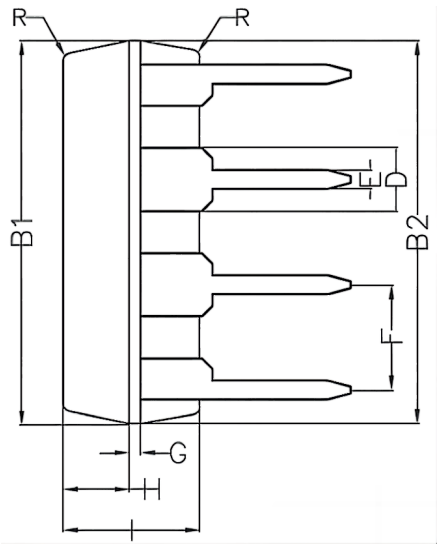


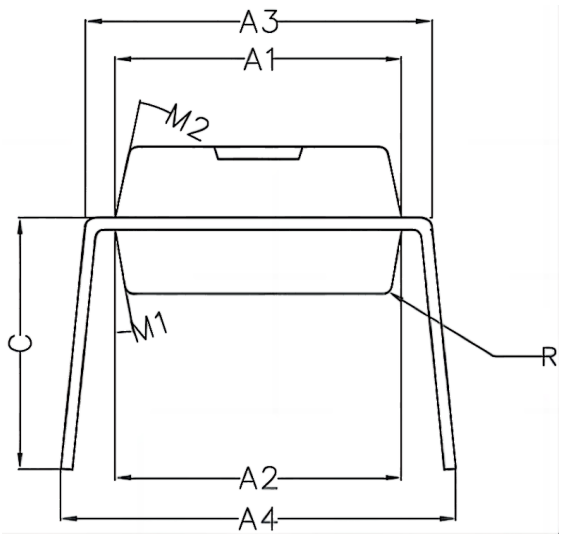


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP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