Quad Low Power RS485 Driver

FEATURES

- Very Low Power: I_{CC} = 110µA Typ
- Designed for RS485 or RS422 Applications
- Single 5V Supply
- –7V to 12V Bus Common Mode Range Permits ±7V GND Difference Between Devices on the Bus
- Thermal Shutdown Protection
- Power-Up/Down Glitch-Free Driver Outputs Permit Live Insertion/Removal of Package
- Driver Maintains High Impedance in Three-State or with the Power Off
- 28ns Typical Driver Propagation Delays with 5ns Skew
- Pin Compatible with the SN75174, DS96174, µA96174, and DS96F174

APPLICATIONS

- Low Power RS485/RS422 Drivers
- Level Translator

DESCRIPTION

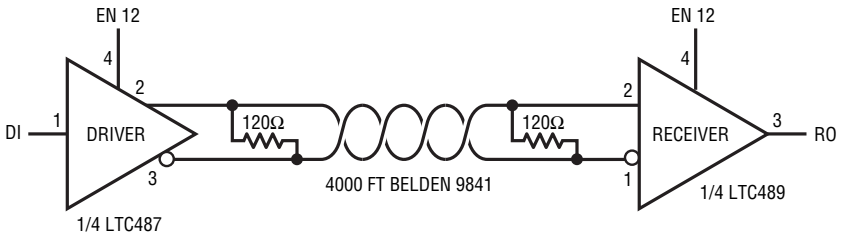
The LTC®487 is a low power differential bus/line driver designed for multipoint data transmission standard RS485 applications with extended common mode range (–7V to 12V). It also meets RS422 requirements.

The CMOS design offers significant power savings over its bipolar counterpart without sacrificing ruggedness against overload or ESD damage.

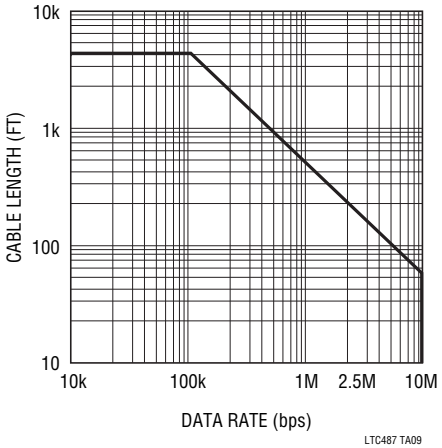
The driver features three-state outputs, with the driver outputs maintaining high impedance over the entire common mode range. Excessive power dissipation caused by bus contention or faults is prevented by a thermal shutdown circuit which forces the driver outputs into a high impedance state.

Both AC and DC specifications are guaranteed from 0°C to 70°C (Commercial), –40°C to 85°C (Industrial) and over the 4.75V to 5.25V supply voltage range.

TYPICAL APPLICATION



RS485 Cable Length Specification*



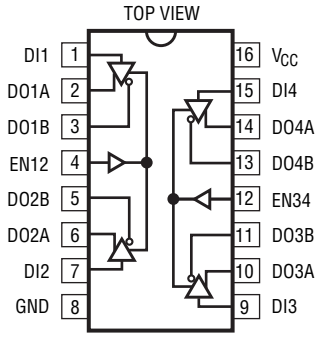
* APPLIES FOR 24 GAUGE, POLYETHYLENE DIELECTRIC TWISTED PAIR

ABSOLUTE MAXIMUM RATINGS

(Note 1)

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

PIN CONFIGURATION



N PACKAGE
16-LEAD PLASTIC DIP

SW PACKAGE
16-LEAD PLASTIC SO

T_{JMAX} = 125°C, θ_{JA} = 70°C/W (N)
T_{JMAX} = 150°C, θ_{JA} = 95°C/W (S)

Consult factory for Military grade parts.

ORDER INFORMATION

LEAD FREE FINISH	TAPE AND REEL	PART MARKING	PACKAGE DESCRIPTION	TEMPERATURE RANGE
LTC487CN#PBF	LTC487CN#TRPBF	LTC487CN	16-Lead Plastic DIP	0°C to 70°C
LTC487CSW#PBF	LTC487CSW#TRPBF	LTC487CSW	16-Lead Plastic SO	0°C to 70°C
LTC487IN#PBF	LTC487IN#TRPBF	LTC487IN	16-Lead Plastic DIP	–40°C to 85°C
LTC487ISW#PBF	LTC487IS#TRPBF	LTC487ISW	16-Lead Plastic SO	–40°C to 85°C

Consult LTC Marketing for parts specified with wider operating temperature ranges.
Consult LTC Marketing for information on non-standard lead based finish parts.

For more information on lead free part marking, go to: http://www.linear.com/leadfree/
For more information on tape and reel specifications, go to: http://www.linear.com/tapeandreel/

DC ELECTRICAL CHARACTERISTICS

V_{CC} = 5V ±5%, 0°C ≤ T_A ≤ 70°C (Commercial), –40°C ≤ T_A ≤ 85°C (Industrial) (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)		2			V
		R = 27Ω; (RS485) (Figure 3)		1.5		5	V
V_{OD}	Change in Magnitude of Driver Differential Output Voltage for Complementary Output States	R = 27Ω or R = 50Ω (Figure 3)				0.2	V
V_{OC}	Driver Common Mode Output Voltage					3	V
$\lvert V_{OC} \rvert$	Change in Magnitude of Driver Common Mode Output Voltage for Complementary Output States					0.2	V
V_{IH}	Input High Voltage	DI, EN12, EN34		2.0		V	
V_{IL}	Input Low Voltage					0.8	V
I_{IN1}	Input Current					±2	µA
I_{CC}	Supply Current	No Load	Output Enabled		110	200	µA
			Output Enabled		110	200	µA
I_{OSD1}	Driver Short-Circuit Current, V_{OUT} = High	V_O = –7V			100	250	mA
I_{OSD2}	Driver Short-Circuit Current, V_{OUT} = Low	V_O = 12V			100	250	mA
I_{OZ}	High Impedance State Output Current	V_O = –7V to 12V			±10	±200	µA

SWITCHING CHARACTERISTICS

V_{CC} = 5V ± 5%, 0°C ≤ T_A ≤ 70°C (Notes 2, 3)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
t_{PLH}	Driver Input to Output	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF	10	30	50	ns
t_{PHL}	Driver Input to Output	(Figures 1, 4)	10	30	50	ns
t_{SKEW}	Driver Output to Output			5	15	ns
t_r, t_f	Driver Rise or Fall Time		5	20	25	ns
t_{ZH}	Driver Enable to Output High	C_L = 100pF (Figures 2, 5) S2 Closed		35	70	ns
t_{ZL}	Driver Enable to Output Low	C_L = 100pF (Figures 2, 5) S1 Closed		35	70	ns
t_{LZ}	Driver Disable Time from Low	C_L = 15pF (Figures 2, 5) S1 Closed		35	70	ns
t_{HZ}	Driver Disable Time from High	C_L = 15pF (Figures 2, 5) S2 Closed		35	70	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 GND unless otherwise specified.

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