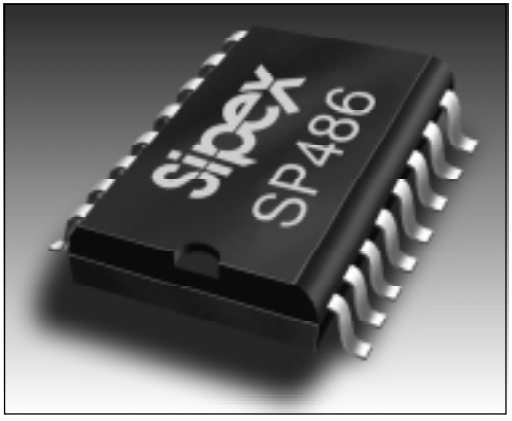
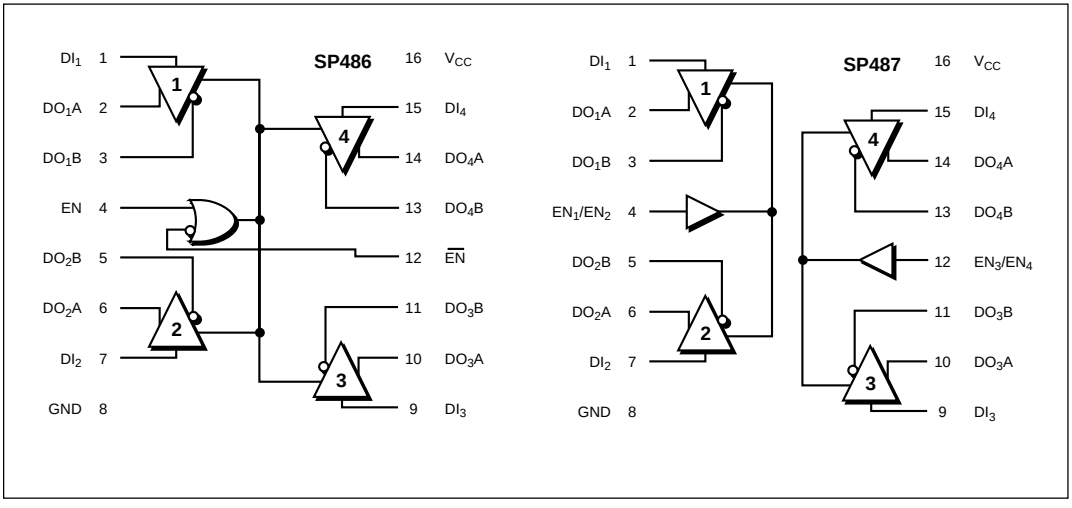
Quad RS-485/RS-422 Line Drivers

- RS-485 or RS-422 Applications
- Quad Differential Line Drivers
- Tri–state Output Control
- 40ns Typical Driver Propagation Delays
- 5ns Skew
- –7V to +12V Common Mode Output Range
- 100µA Supply Current
- Single +5V Supply Operation
- Pin Compatible with SN75172, SN75174, LTC486, and LTC487



DESCRIPTION…

The **SP486** and **SP487** are low–power quad differential line drivers meeting RS-485 and RS-422 standards. The **SP486** features a common driver enable control; the **SP487** provides independent driver enable controls for each pair of drivers. Both feature tri–state outputs and wide common–mode input range. Both are available in 16–pin plastic DIP and SOIC packages.



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ABSOLUTE MAXIMUM RATINGS

These are stress ratings only and functional operation of the device at these or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

V_{CC} ..... +7V
Input Voltages
  Logic ..... –0.5V to (V_{CC} +0.5V)
  Drivers ..... –0.5V to (V_{CC} +0.5V)
Driver Output Voltage ..... ±14V
Input Currents
  Logic ..... ±25mA
  Driver ..... ±25mA
Storage Temperature ..... –65°C to +150°C
Power Dissipation
  Plastic DIP 375mW
  (derate 7mW/°C above +70°C)
  Small Outline 375mW
  (derate 7mW/°C above +70°C)
Lead Temperature (soldering, 10 sec) ..... 300°C

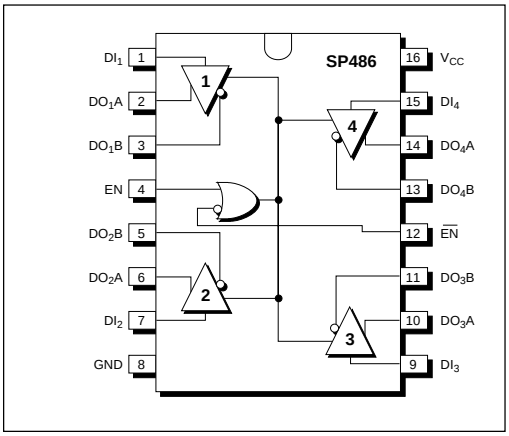
SPECIFICATIONS

V_{CC} = 5V±5%; typicals at 25°C; $T_{MIN} \le T_A \le T_{MAX}$ unless otherwise noted.

PARAMETER	MIN.	TYP.	MAX.	UNIT	CONDITIONS
DC CHARACTERISTICS					
Digital Inputs					DI, EN, $\overline{EN}$, EN_1/EN_2, EN_3/EN_4
Voltage					
V_{IL}			0.8	Volts	
V_{IH}	2.0			Volts	
Input Current			±2	µA	V_{IN} = 0V to V_{CC}
DRIVER OUTPUTS					
Differential Voltage			5	Volts	I_O = 0; unloaded
	2			Volts	R_L = 50Ω(RS-422)
	1.5	2	5	Volts	R_L = 27Ω (RS-485); *Fig. 1*
Change in Output Magnitude for Complementary Output State			0.2	Volts	R_L = 27Ω or 50Ω ; *Fig. 1*
Common Mode Output Voltage		2.3	3	Volts	R_L = 27Ω or 50Ω; *Fig. 1*
Change in Common Mode Output Magnitude for Complementary Output State			0.2	Volts	R_L = 27Ω or 50Ω; *Fig. 1* R_L = 50Ω (RS-422) R_L = 27Ω (RS-485)
Maximum Data Rate	10			Mbps	
Short–circuit Current					
V_{OH}			±250	mA	–7V ≤V_O ≤ +10V
V_{OL}			±250	mA	–7V ≤V_O ≤ +10V
High Impedance Output Current		±2	±200	µA	V_O = –7V to +10V
POWER REQUIREMENTS					
Supply Voltage	4.75	5.00	5.25	Volts	
Supply Current		0.5	10	µA	No load, output enabled
		0.5	10	µA	No load, output disabled
ENVIRONMENTAL AND MECHANICAL					
Operating Temperature					
–C	0		+70	°C	
–E	–40		+85	°C	
Storage Temperature	–65		+150	°C	
Package					
–_S	16–pin Plastic DIP				
–_T	16–pin SOIC				

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PINOUT — SP486



SP486 PINOUT

Pin 1 — DI_1 — Driver 1 Input — If Driver 1 output is enabled, logic 0 on DI_1 forces driver output DO_1A low and DO_1B high. A logic 1 on DI_1 with Driver 1 output enabled forces driver DO_1A high and DO_1B low.

Pin 2 — DO_1A — Driver 1 output A.

Pin 3 — DO_1B — Driver 1 output B.

Pin 4 — EN — Driver Output Enable. Please refer to SP486 *Truth Table (1).*

Pin 5 — DO2B — Driver 2 output B.

Pin 6 — DO_2A — Driver 2 output A.

Pin 7 — DI_2 — Driver 2 Input — If Driver 2 output is enabled, logic 0 on DI_2 forces driver output DO_2A low and DO_2B high. A logic 1 on DI_2 with Driver 2 output enabled forces driver DO_2A high and DO_2B low.

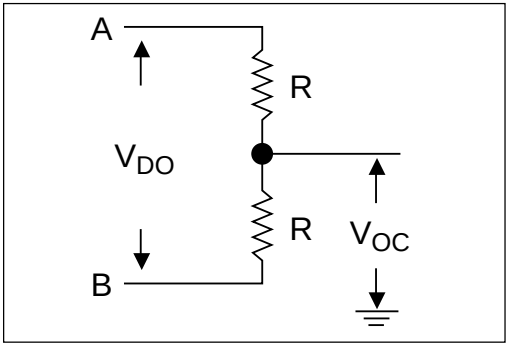


Figure 1. Driver DC Test Load

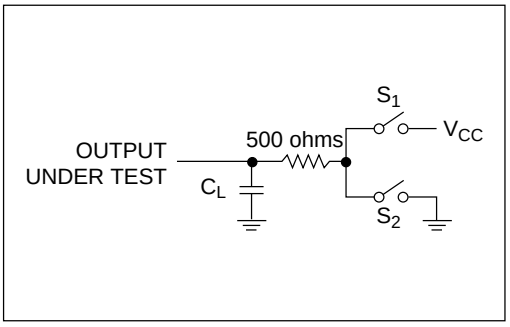


Figure 3. Driver Timing Test Load

Pin 8 — GND — Digital Ground.

Pin 9 — DI_3 — Driver 3 Input — If Driver 3 output is enabled, logic 0 on DI_3 forces driver output DO_3A low and DO_3B high. A logic 1 on DI_3 with Driver 3 output enabled forces driver DO_3A high and DO_3B low.

Pin 10 — DO_3A — Driver 3 output A.

Pin 11 — DO_3B — Driver 3 output B.

Pin 12 — $\overline{EN}$ — Driver Output Disable. Please refer to SP486 *Truth Table (1).*

Pin 13 — DO_4B — Driver 4 output B.

Pin 14 — DO_4A — Driver 4 output A.

Pin 15 — DI_4 — Driver 4 Input — If Driver 4 output is enabled, logic 0 on DI_4 forces driver output DO_4A low and DO_4B high. A logic 1 on DI_4 with Driver 3 output enabled forces driver DO_4A high and DO_4B low.

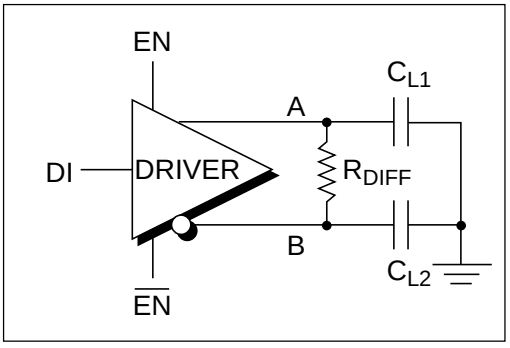
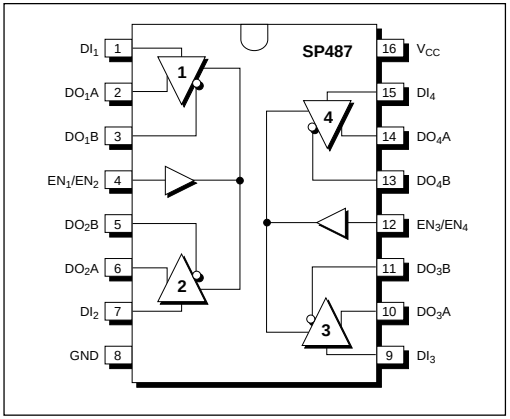


Figure 2. Driver Timing Test

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PINOUT — SP487



Pin 16 — Supply Voltage V_{CC} — 4.75V ≤ V_{CC} ≤ 5.25V.

SP487 PINOUT

Pin 1 — DI_1 — Driver 1 Input — If Driver 1 output is enabled, logic 0 on DI_1 forces driver output DO_1A low and DO_1B high. A logic 1 on DI_1 with Driver 1 output enabled forces driver DO_1A high and DO_1B low.

Pin 2 — DO_1A — Driver 1 output A.

Pin 3 — DO_1B — Driver 1 output B.

Pin 4 — EN_1/EN_2 — Driver 1 and 2 Output Enable. Please refer to SP487 Truth Table (2).

Pin 5 — DO_2B — Driver 2 output B.

Pin 6 — DO_2A — Driver 2 output A.

Pin 7 — DI_2 — Driver 2 Input — If Driver 2 output is enabled, logic 0 on DI_2 forces driver output DO_2A low and DO_2B high. A logic 1 on DI_2 with Driver 2 output enabled forces driver DO_2A high and DO_2B low.

Pin 8 — GND — Digital Ground.

Pin 9 — DI_3 — Driver 3 Input — If Driver 3 output is enabled, logic 0 on DI_3 forces driver output DO_3A low and DO_3B high. A logic 1 on DI_3 with Driver 3 output enabled forces driver DO_3A high and DO_3B low.

Pin 10 — DO_3A — Driver 3 output A.

INPUT	ENABLES		OUTPUTS	
DI	EN	$\overline{EN}$	OUTA	OUTB
H	H	X	H	L
L	H	X	L	H
H	X	L	H	L
L	X	L	L	H
X	L	H	Hi–Z	Hi–Z

Table 1. SP486 Truth Table

Pin 11 — DO_3B — Driver 3 output B.

Pin 12 — EN_3/EN_4 — Driver 3 and 4 Output Enable. Please refer to SP487 *Truth Table (2).*

Pin 13 — DO_4B — Driver 4 output B.

Pin 14 — DO_4A — Driver 4 output A.

Pin 15 — DI_4 — Driver 4 Input — If Driver 4 output is enabled, logic 0 on DI_4 forces driver output DO_4A low and DO_4B high. A logic 1 on DI_4 with Driver 3 output enabled forces driver DO_4A high and DO_4B low.

Pin 16 — Supply Voltage V_{CC} — 4.75V ≤ V_{CC} ≤ 5.25V.

FEATURES...

The **SP486** and **SP487** are low–power quad differential line drivers meeting RS-485 and RS-422 standards. The **SP486** features active high and active low common driver enable controls; the **SP487** provides independent, active high driver enable controls for each pair of drivers. The driver outputs are short–circuit limited to 200mA. Data rates up to 10Mbps are supported. Both are available in 16–pin plastic DIP and SOIC packages.

INPUT	ENABLES	OUTPUTS	
DI	EN1/EN2 or EN3/EN4	OUTA	OUTB
H	H	H	L
L	H	L	H
X	L	Hi–Z	Hi–Z

Table 2. SP487 Truth Table

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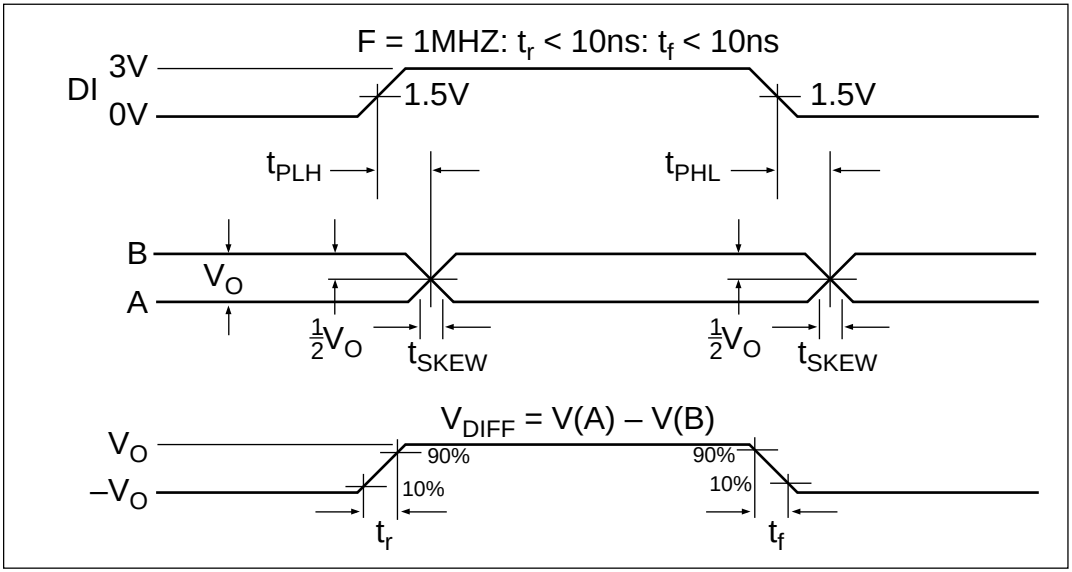


Figure 4. Driver Propagation Delays

AC PARAMETERS

V_{CC} = 5V±5%; typicals at 25°C; 0°C ≤ T_A ≤ +70°C unless otherwise noted.

PARAMETER	MIN.	TYP.	MAX.	UNIT	CONDITIONS
PROPAGATION DELAY					
Driver Input to Output					R_{DIFF} = 54 Ohms, C_{L1}= C_{L2}= 100pF; *Figure 2*
Low to High (t_{PLH})	20	40	60	ns	
High to Low (t_{PHL})	20	40	60	ns	
Driver Output to Output (t_{SKEW})		5	15	ns	
Driver Rise Time (t_R)					10% to 90%
SP486		20		ns	
SP487		20		ns	
Driver Fall Time (t_F)					90% to 10%
SP486		20		ns	
SP487		20		ns	
DRIVER ENABLE					
To Output High		60	110	ns	C_L = 100pF; *Figures 3 and 5* (S_2 closed)
To Output Low		60	115	ns	C_L = 100pF; *Figures 3 and 5* (S_1 closed)
DRIVER DISABLE					
From Output Low		60	130	ns	C_L = 15pF; *Figures 3 and 5* (S_1 closed)
From Output High		60	130	ns	C_L = 15pF; *Figures 3 and 5* (S_2 closed)

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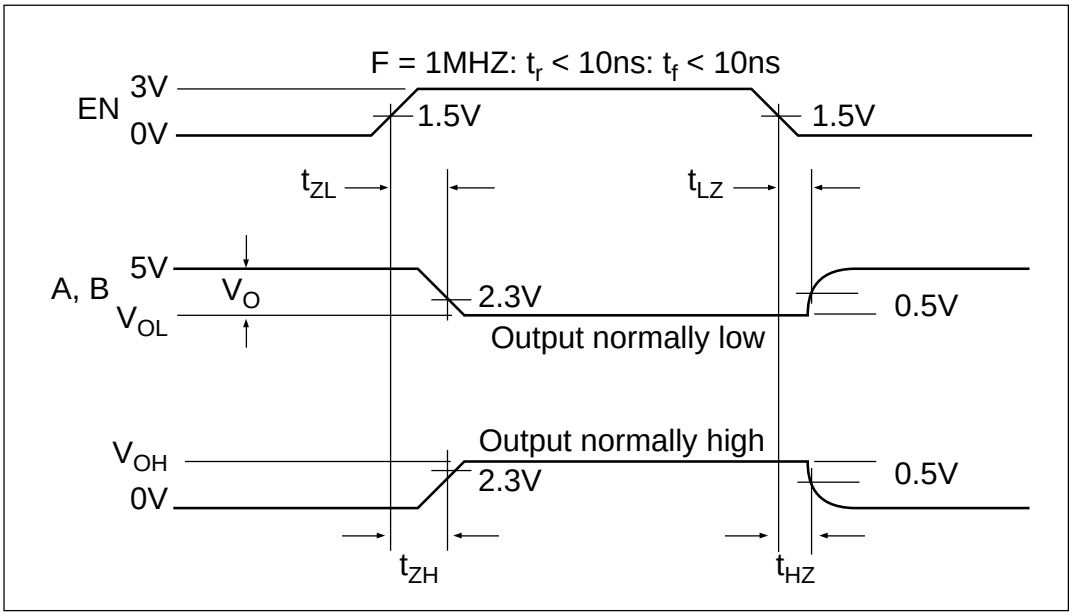


Figure 5. Driver Enable/Disable Timing

ORDERING INFORMATION

Quad RS485 Drivers:

Model	Enable/Disable	Temperature Range	Package
SP486CS	Common; active Low and Active High	0°C to +70°C	16–pin Plastic DIP
SP486CT	Common; active Low and Active High	0°C to +70°C	16–pin SOIC
SP486ES	Common; active Low and Active High	–40°C to +85°C	16–pin Plastic DIP
SP486ET	Common; active Low and Active High	–40°C to +85°C	16–pin SOIC
SP487CS	One per driver pair; active High	0°C to +70°C	16–pin Plastic DIP
SP487CT	One per driver pair; active High	0°C to +70°C	16–pin SOIC
SP487ES	One per driver pair; active High	–40°C to +85°C	16–pin Plastic DIP
SP487ET	One per driver pair; active High	–40°C to +85°C	16–pin SOIC

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SIGNAL PROCESSING EXCELLENCE

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