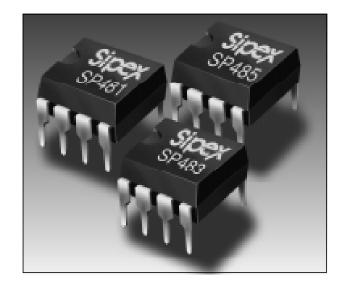


SP481/SP483/SP485

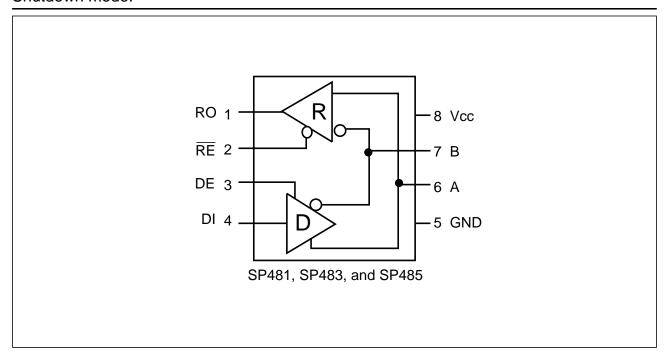
Low Power Half-Duplex RS-485 Transceivers

- +5V Only
- Low Power BiCMOS
- Driver/Receiver Enable
- Slew Rate Limited Driver for Low EMI (SP483)
- Low Power Shutdown Mode (SP481 and SP483)
- RS-485 and RS-422 Drivers/Receivers



DESCRIPTION

The **SP481**, **SP483**, and the **SP485** are a family of half-duplex transceivers that meet the requirements of RS-485 and RS-422. Their BiCMOS design allows low power operation without sacrificing performance. The **SP481** and **SP485** meet the requirements of RS-485 and RS-422 up to 5Mbps. Additionally, the **SP481** is equipped with a low power Shutdown mode. The **SP483** is internally slew rate limited to reduce EMI and can meet the requirements of RS-485 and RS-422 up to 250kbps. The **SP483** is also equipped with a low power Shutdown mode.



ABSOLUTE MAXIMUM RATINGS

These are stress ratings only and functional operation of the device at these ratings 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}	±12V
V _{cc} Input Voltages	
Logic	0.3V to (V _{cc} +0.5V)
Drivers	$-0.3V \text{ to } (V_{cc}^{+0.5V})$
Receivers	±15V
Output Voltages	
Logic	0.3V to (V _{cc} +0.5V)
Drivers	±15V
Receivers	0.3V to (V _{cc} +0.5V)
Receivers Storage Temperature	65°C to +150°C
Power Dissipation	

SPECIFICATIONS

 T_{MIN} to T_{MAX} and V_{CC} = 5V \pm 5% unless otherwise noted.

SP481/SP483/SP485 DRIVER DC Characteristics Differential Output Voltage Differential Output Voltage GND 2 V _{CC} Volts Volts with load; R = 50Ω; (RS422); see figure 1 Differential Output Voltage Differential Output Voltage Change in Magnitude of Driver Differential Output Voltage for Complimentary States Driver Common-Mode Output Voltage Input Lingh Voltage Input Lingh Voltage Input Current Vour = HIGH 35 0.2 Volts Volts Volts R = 27Ω or R = 50Ω; see figure 1 Differential Output Voltage Change Input Current Vour = HIGH Vour = LOW 3.8 Volts Volts Applies to DE, DI, RE APPLIE APPLIED	PARAMETERS PARAMETERS	MIN.	TYP.	MAX.	UNITS	CONDITIONS	
Differential Output Voltage Differential Output Voltage Differential Output Voltage 2 V_{CC} Volts Volts Volts Volts Volts with load; $R = 50\Omega$; $(RS422)$; $see figure 1$ With load; $R = 50\Omega$; $(RS422)$; $see figure 1$ With load; $R = 50\Omega$; $(RS422)$; $see figure 1$ With load; $R = 50\Omega$; $(RS485)$; $see figure 1$ With load; $R = 27\Omega$ or $R = 50\Omega$; $see figure 1$ With load; $R = 27\Omega$ or $R = 50\Omega$; $see figure 1$ Volts Driver Common-Mode Output Voltage Input Low Voltage Input Low Voltage Input Low Voltage Input Current Vout PHIGH 35 Volts Applies to DE, DI, RE Applies to D	SP481/SP483/SP485 DRIVER						
Differential Output Voltage Differential Output Voltage Change in Magnitude of Driver Differential Output Voltage for Complimentary States Driver Common-Mode Output Voltage Input Low Voltage Input Low Voltage Input Low Voltage Input Current Driver Short-Circuit Current Vout = HIGH Vout = LOW 35	DC Characteristics						
Differential Output Voltage Change in Magnitude of Driver Differential Output Voltage for Complimentary States Driver Common-Mode Output Voltage Input High Voltage Input Low Voltage Input Input Low Input Low Voltage Input Input to Output Input Low Voltage Input I		GND		V _{cc}			
Differential Output Voltage Change in Magnitude of Driver Differential Output Voltage Solution of Complimentary States Driver Common-Mode Output Voltage Input High Voltage Input High Voltage Input Low Voltage Input Input Low Voltage Input Input to Output Input Low Input Low Voltage Input Inpu	Differential Output Voltage	2		V _{cc}	Volts		
Change in Magnitude of Driver Differential Output Voltage for Complimentary States Driver Common-Mode Output Voltage Input High Voltage Input Low Voltage Input Low Voltage Input Low Voltage Input Current Driver Short-Circuit Current ± 10							
Differential Output Voltage for Complimentary States Driver Common-Mode Output Voltage Support Common-Mode Output Voltage Support Common-Mode Output High Voltage Support Common-Mode Output Current Support Common-Mode Output Current Support Common-Mode Output Current Support Common-Mode Output Output Output Support Common-Mode Output Output Output Output Support Common-Mode Output Out		1.5		V _{cc}	Volts	with load; $R = 27\Omega$; (RS485); see figure 1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				0.2	Volte	R - 270 or R - 500; see figure 1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				0.2	VOILS	1 = 27 52 01 1 = 3052, 300 ligare 1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1			3	Volts	$R = 27\Omega$ or $R = 50\Omega$: see figure 1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		2.0			I I		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				0.8	Volts		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				±10	μΑ	Applies to DE, DI, RE	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						-14 .14	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	V _{OUT} = HIGH	1				$-7V \le V_0 \le +12V$	
AC Characteristics Maximum Data Rate5Mbps \overline{RE} = 5V, DE = 5VDriver Input to Output203060ns t_{PLH} ; R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF; see figures 3 and 6Driver Input to Output203060ns t_{PHL} ; R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF; see figures 3 and 6Driver Skew510nssee figures 3 and 6Driver Rise or Fall Time31540ns t_{SKEW} = t_{DPLH} - t_{DPH} From 10% to 90%; R_{DIFF} = 54Ω, R_{CL} = 100pF; see figures 3 and 6Driver Enable to Output High Driver Enable to Output Low Driver Disable Time from Low Driver Disable Time from High4070ns R_{CL} = 100pF; see figures 4 & 75, s closed R_{CL} = 100pF; see figures 2 & 9; S, closed R_{CL} = 15pF; see figures 2 & 9; S, closed R_{CL}	V _{OUT} = LOVV	35		250	l mA	$-7 \text{ V} \leq \text{ V}_{\text{O}} \leq +12 \text{ V}$	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	SP481/SP485 DRIVER						
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$							
Driver Input to Output $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					Mbps		
$ \begin{array}{ c c c c c } \hline \text{Driver Input to Output} & 20 & 30 & 60 & \text{ns} & t_{\text{PHL}}; R_{\text{DIFF}} = 54\Omega, C_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \\ \hline \text{See figures 3 and 6} \\ \hline \text{Driver Rise or Fall Time} & 3 & 15 & 40 & \text{ns} & \frac{t_{\text{SKEW}}}{t_{\text{SKEW}}} = t_{\text{DPLH}} - t_{\text{DPHL}} \\ \hline \text{From 10\% to 90\%}; R_{\text{DIFF}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 54\Omega, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 12V, \\ \hline \text{C}_{\text{L}_1} = C_{\text{L}_2} = 100 \text{pF}; \frac{t_{\text{DF}}}{t_{\text{DF}}} = 12V$	Driver Input to Output	20	30	60	ns	t_{PLH} ; $R_{DIFF} = 54\Omega$, $C_{L1} = C_{L2} = 100pF$;	
Driver Skew $ \begin{array}{ c c c c c c } \hline Driver Skew & 5 & 10 & ns & see figures 3 and 6 \\ \hline Driver Rise or Fall Time & 3 & 15 & 40 & ns & Fall Time \\ \hline Driver Rise or Fall Time & 3 & 15 & 40 & ns & Fall Time \\ \hline Driver Enable to Output High Driver Enable to Output Low Driver Disable Time from Low Driver Disable Time from High & 40 & 70 & ns & C_L = 100pF; see figures 4 & 7; S_1 closed & 70 & ns & C_L = 100pF; see figures 4 & 7; S_1 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_1 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_1 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & ns & C_L = 15pF; see figures 2 & 9; S_2 closed & 70 & 10 & 10 & 10 & 10 & 10 & 10 & 10$	Driver Input to Output	20	20	60	no		
Driver Skew	Driver input to Output	20	30	00	115	c_{PHL} , $c_{DIFF} = 3452$, $c_{L1} = c_{L2} = 100 pr$,	
Driver Rise or Fall Time 3 15 40 ns $t_{SKEW} = t_{DPLH} - t_{DPHL} $ From 10% to 90%; $R_{DIFF} = 54\Omega$, $C_{L1} = C_{L2} = 100pF$; see figures 3 and 6 Driver Enable to Output High Driver Enable to Output Low 40 70 ns $C_{L} = 100pF$; see figures 4 & 7; S_{L} closed Driver Disable Time from Low Driver Disable Time from High 40 70 ns $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed Driver Disable Time from High 40 70 ns $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; S_{L} closed $C_{L} = 15pF$; see figures 2 & 9; $S_{L} = 15pF$; se	Driver Skew		5	10	ns		
Driver Enable to Output High Driver Enable to Output Low Driver Disable Time from Low Driver Disable Time from High $\begin{pmatrix} 40 & 70 & ns & C_L = 100pF; see figures 4 \& 7; S_2 \text{ closed} \\ 40 & 70 & ns & C_L = 100pF; see figures 4 \& 7; S_1 \text{ closed} \\ C_L = 100pF; see figures 2 \& 9; S_1 \text{ closed} \\ C_L = 15pF; see figures 2 \& 9; S_1 \text{ closed} \\ C_L = 15pF; see figures 2 \& 9; S_1 \text{ closed} \\ C_L = 15pF; see figures 2 \& 9; S_2 \text{ closed} \\ C_L = 15pF; see figur$						$t_{\text{CNEW}} = t_{\text{DDLH}} - t_{\text{DDLH}} $	
Driver Enable to Output High Driver Enable to Output Low Driver Disable Time from Low Driver Disable Time from High $\begin{pmatrix} 40 & 70 & ns & C_L = 100pF; see figures 4 \& 7; S_2 \text{ closed} \\ 40 & 70 & ns & C_L = 100pF; see figures 4 \& 7; S_1 \text{ closed} \\ C_L = 100pF; see figures 2 \& 9; S_1 \text{ closed} \\ C_L = 15pF; see figures 2 \& 9; S_1 \text{ closed} \\ C_L = 15pF; see figures 2 \& 9; S_2 \text{ closed} \\ C_L = 15pF; see figur$	Driver Rise or Fall Time	3	15	40	ns	From 10% to 90%; $R_{DIFF} = 54\Omega$,	
Driver Enable to Output Low Driver Disable Time from Low Driver Disable Time from High $\begin{pmatrix} 40 & 70 & ns & C_L = 100pF; see figures 4 \& 7; S_1 closed \\ 40 & 70 & ns & C_L = 15pF; see figures 2 \& 9; S_1 closed \\ 40 & 70 & ns & C_L = 15pF; see figures 2 \& 9; S_1 closed \\ C_L = 15pF; see figures 2 \& 9; S_2 closed \\ \hline \\ \textbf{SP481/SP483/SP485 RECEIVER} \\ \textbf{DC Characteristics} \\ \textbf{Differential Input Threshold} \\ \textbf{Input Hysteresis} \\ \textbf{Output Voltage High} \\ \textbf{Output Voltage Low} \\ \textbf{Three-State (High Impedance)} \\ \textbf{Output Current} \\ \textbf{Input Resistance} \\ \textbf{Input Current (A, B); V_{IN} = 12V} \\ \textbf{Input Current (A, B); V_{IN} = -7V} \\ \hline \end{pmatrix} \textbf{15} \qquad \begin{pmatrix} 40 & 70 & ns & C_L = 100pF; see figures 4 \& 7; S_1 closed \\ 40 & 70 & ns & C_L = 15pF; see figures 2 \& 9; S_2 closed \\ \textbf{Volts} & -7V \le V_{CM} \le +12V \\ \textbf{Volts} & -7V \le V_{CM} \le +12V \\ \textbf{Input Current (A, B); V_{IN} = 12V} \\ \textbf{Input Current (A, B); V_{IN} = -7V} \\ \hline \end{pmatrix} \textbf{10} \qquad \begin{pmatrix} 40 & 70 & ns & C_L = 15pF; see figures 2 \& 9; S_1 closed \\ \textbf{Volts} & -7V \le V_{CM} \le +12V \\ \textbf{Volts} & -7V \le V_{CM} \le +12V \\ \textbf{Volts} & -7V \le V_{CM} \le +12V \\ \textbf{Input Current (A, B); V_{IN} = -7V} \\ \hline \end{pmatrix} \textbf{10} \qquad \begin{pmatrix} 40 & 70 & ns & C_L = 15pF; see figures 2 \& 9; S_1 closed \\ \textbf{Volts} & -7V \le V_{CM} \le +12V \\ \textbf{Volts} & -7V \le V_{CM} \le +12V \\ \textbf{Volts} & -7V \le V_{CM} \le +12V \\ \textbf{Input Current (A, B); V_{IN} = -7V} \\ \hline \end{pmatrix} \textbf{10} \qquad \begin{pmatrix} 40 & V_{CM} \le V_{CM}$						$C_{L1} = C_{L2} = 100$ pF; see tigures 3 and 6	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			_		ns		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			_				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$							
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Driver disable Time from High		40	/0	ns	$C_L = 15pr;$ see figures 2 & 9; S_2 closed	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	SP481/SP483/SP485 RECEIVE	SP481/SP483/SP485 RECEIVER					
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$							
	Differential Input Threshold	-0.2		+0.2		-7V ≤ V _{CM} ≤ +12V	
			10		I I	$V_{CM} = 0V$	
		3.5			I I	$I_{O} = -4 \text{mA}, V_{ID} = +200 \text{mV}$	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				0.4	Volts	$I_{O} = +4mA, V_{ID} = -200mV$	
Input Resistance 12 15 $k\Omega$ $-7V \le V_{CM} \le +12V$ Input Current (A, B); $V_{IN} = 12V$ $+1.0$				1	,	0.4\/<\/ < 2.4\/: DE = 5\/	
Input Current (A, B); $V_{IN} = 12V$		12	15			$0.40 \le v_0 \le 2.40$, RE = 50	
Input Current (A, B); $V_{IN} = -7V$ -0.8 mA DE = 0V, $V_{CC} = 0V$ or 5.25V, $V_{IN} = -7V$		14	'3	+10	I I	$DE = 0V$, $V_{co} = 0V$ or 5.25V, $V_{co} = 12V$	
Short-Circuit Current 7 95 mA 0V < V _{2.1.} < V _{2.2}					I I	$DE = 0V, V_{CC} = 0V \text{ or } 5.25V, V_{IN} = -7V$	
1	Short-Circuit Current	7		95	mA	$0V \le V_{CM} \le V_{CC}$	

SPECIFICATIONS (continued)

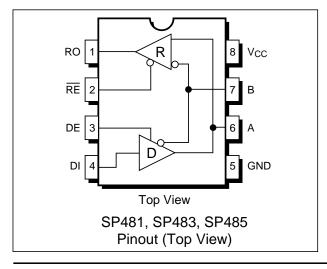
 T_{min} to T_{max} and V_{CC} = 5V \pm 5% unless otherwise noted.

T_{MIN} to T_{MAX} and $V_{CC} = 5V \pm 5\%$ unless otherw PARAMETERS	MIN.	TYP.	MAX.	UNITS	CONDITIONS
SP481/SP485 RECEIVER	WIIIN.	IIF.	IVIAA.	UNITS	CONDITIONS
OF 40 I/OF 400 REGERVER					
AC Characteristics					
Maximum Data Rate	5			Mbps	$\overline{RE} = 0V$, $DE = 0V$
Receiver Input to Output	60	90	200	ns	t_{PLH} ; $R_{DIFF} = 54\Omega$,
Described land to Outrot	00	00	000		$C_{L1} = C_{L2} = 100 \text{pF}$; Figures 3 & 8
Receiver Input to Output	60	90	200	ns	$t_{PHL}; R_{DIFF} = 54\Omega,$ $C_{L1} = C_{L2} = 100pF; Figures 3 & 8$
Diff. Receiver Skew It _{PI H} -t _{PHI} I		13		ns	$R_{DIFF} = 54\Omega; C_{L1} = C_{L2} = 100pF;$
Dill: Redelver Grew riplin thill		10		110	Figures 3 & 8
Receiver Enable to					g
Output Low		20	50	ns	C _{RL} = 15pF; Figures 2 & 9; S ₁ closed
Receiver Enable to					
Output High		20	50	ns	$C_{RL} = 15pF$; Figures 2 & 9; S_2 closed
Receiver Disable from Low		20	50	ns	C _{RL} = 15pF; <i>Figures 2 & 9;</i> S ₁ closed
Receiver Disable from High		20	50	ns	C _{RL} = 15pF; <i>Figures 2 & 9;</i> S ₂ closed
SP481					
Shutdown Timing					
Time to Shutdown	50	200	600	ns	$\overline{RE} = 5V$, DE = 0V
Driver Enable from Shutdown		40	100		C 100pE, Configures 4 9 7 C closed
to Output High Driver Enable from Shutdown		40	100	ns	$C_L = 100 pF$; See figures 4 & 7; S_2 closed
to Output Low		40	100	ns	C ₁ = 100pF; See figures 4 & 7; S ₁ closed
Receiver Enable from		10	100	110	
Shutdown to Output High		300	1000	ns	C ₁ = 15pF; See figures 2 & 9; S ₂ closed
Receiver Enable from					
Shutdown to Output Low		300	1000	ns	C _L = 15pF; <i>See figures 2 & 9;</i> S ₁ closed
POWER REQUIREMENTS					
Supply Voltage	+4.75		+5.25	Volts	
Supply Current	74.73		+5.25	VOILS	
SP481/485					
No Load		900		mA	\overline{RE} , DI = 0V or V_{CC} ; DE = V_{CC}
				μΑ	\overline{RE} , DI = 0V or V_{CC} ; DE = V_{CC} \overline{RE} = 0V, DI = 0V or 5V; DE = 0V
SP483					
No Load		600		μΑ	\overrightarrow{RE} , DI = 0V or V_{CC} ; DE = V_{CC} \overrightarrow{RE} =0V, DI = 0V or 5V; DE = 0V
SP481/SP483				μΑ	KE=UV, DI = UV OF 5V; DE = UV
Shutdown Mode			10	μΑ	$DE = 0V, \overline{RE} = V_{CC}$
			'0	μιτ	22 - 31,112 - 1 _{CC}
ENVIRONMENTAL AND					
MECHANICAL					
Operating Temperature					
Commercial (_C_)	0		+70	°C	
Industrial (_E_)	-40 65		+85	°C	
Storage Temperature Package	-65		+150	"	
Plastic DIP (_S)					
NSOIC (_N)					
(

SP483 AC SPECIFICATIONS

 $\rm T_{MIN}$ to $\rm T_{MAX}$ and $\rm V_{CC}$ = 5V \pm 5% unless otherwise noted.

PARAMETERS	MIN.	TYP.	MAX.	UNITS	CONDITIONS
SP483 DRIVER					
AC Characteristics					
Maximum Data Rate	250			kbps	
Driver Input to Output	250	800	2000	ns	t_{PLH} ; $R_{DIFF} = 54\Omega$, $C_{L1} = C_{L2}^{=} 100 pF$;
D : 01	050	000	0000		see figures 3 & 6
Driver Skew	250	800	2000	ns	t_{PHL} ; $R_{DIFF} = 54\Omega$, $C_{L1} = C_{L2}^{=} 100 pF$; see figures 3 & 6
Driver Rise and Fall Time		100	800	ns	see figures 3 & 6,
2 Troi rilee and rain rillie				1.0	$t_{\text{SKEW}} = t_{\text{DPLH}} - t_{\text{DPHL}} $
	250		2000	ns	From 10% to 90%; $R_{DIFF} = 54\Omega$,
5. 5. 11. 6. 11.	0=0				$C_{14} = C_{12} = 100 \text{pF}$, see figures 3 & 6
Driver Enable to Output High Driver Enable to Output Low	250 250		2000 2000	ns	$C_L^{L} = 100pF$; See figures 4 & 7; S_2 closed $C_1 = 100pF$; See figures 4 & 7; S_1 closed
Driver Disable Time from Low	300		3000	ns ns	$C_1 = 100$ pF, See ligures 4 & 7, S_1 closed $C_1 = 15$ pF; See figures 4 & 7; S_1 closed
Driver Disable Time from High	300		3000	ns	$C_1 = 15pF$; See figures 4 & 7; S_2 closed
SP483 RECEIVER					
AC Characteristics					
Maximum Data Rate	250			kbps	
Receiver Input to Output	250		2000	ns	t_{PLH} ; $R_{DIFF} = 54\Omega$, $C_{L1} = C_{L2} = 100pF$;
Diff Describes Observed to the		400			Figures 3 & 8
Diff. Receiver Skew It _{PLH} -t _{PHL} I		100		ns	$R_{DIFF} = 54\Omega, C_{L1} = C_{L2} = 100pF;$ Figures 3 & 8
Receiver Enable to					rigures 3 & 6
Output Low		20	50	ns	C _{RI} = 15pF; Figures 2 & 9; S ₁ closed
Receiver Enable to					
Output High		20	50	ns	C _{RL} = 15pF; <i>Figures 2 & 9</i> ; S ₂ closed
Receiver Disable from Low Receiver Disable from High		20 20	50 50	ns ns	C _{RL} = 15pF; Figures 2 & 9; S ₁ closed C _{RI} = 15pF; Figures 2 & 9; S ₂ closed
Receiver Disable from Flight		20	30	113	RL = 15pi , rigures 2 & 3, 5 ₂ closed
SP483					
Shutdown Timing					
Time to Shutdown	50	200	600	ns	RE = 5V, DE = 0V
Driver Enable from Shutdown					
to Output High			2000	ns	C _L = 100pF; See figures 4 & 7; S ₂ closed
Driver Enable from Shutdown to Output Low			2000	ns	C ₁ = 100pF; <i>See figures 4 & 7;</i> S ₁ closed
Receiver Enable from			2000	1115	O _L
Shutdown to Output High			2500	ns	C ₁ = 15pF; <i>See figures 4 & 7;</i> S ₂ closed
Receiver Enable from					
Shutdown to Output Low			2500	ns	C _L = 15pF; <i>See figures 4 & 7;</i> S ₁ closed
1	I		l .	I	1



PIN FUNCTION

Pin#	Name	Description
1	RO	Receiver Output.
2	$\overline{\text{RE}}$	Receiver Output Enable
		Active LOW.
3	DE	Driver Output Enable
		Active HIGH.
4	DI	Driver Input.
5	GND	Ground Connection.
6	A	Driver Output/Receiver Input
		Non-inverting.
7	В	Driver Output/Receiver Input
		Inverting.
8	Vcc	Positive Supply 4.75V <vcc< 5.25v.<="" td=""></vcc<>

DESCRIPTION SP481, SP483, SP485

The **SP481**, **SP483**, and **SP485** are half-duplex differential transceivers that meet the requirements of RS-485 and RS-422. Fabricated with a Sipex proprietary BiCMOS process, all three products require a fraction of the power of older bipolar designs.

The RS-485 standard is ideal for multi-drop applications and for long-distance interfaces. RS-485 allows up to 32 drivers and 32 receivers to be connected to a data bus, making it an ideal choice for multi-drop applications. Since the cabling can be as long as 4,000 feet, RS-485 transceivers are equipped with a wide (-7V to +12V) common mode range to accommodate ground potential differences. Because RS-485 is a differential interface, data is virtually immune to noise in the transmission line.

Drivers SP481, SP483, SP485

The driver outputs of the **SP481**, **SP483**, and **SP485** are differential outputs meeting the RS-485 and RS-422 standards. The typical voltage output swing with no load will be 0 volts to +5 volts. With worst case loading of 54Ω across the differential outputs, the drivers can maintain greater than 1.5V voltage levels. The drivers of the **SP481**, **SP483** and **SP485** have an enable control line which is active HIGH. A logic HIGH on DE (pin 5) will enable the differential driver outputs. A logic LOW on DE (pin 5) will tri-state the driver outputs.

The transmitters of the **SP481** and **SP485** will operate up to at least 5Mbps. The **SP483** has internally slew rate limited driver outputs to minimize EMI. The maximum data rate for the **SP483** driver is 250kbps.

Receivers SP481, SP483, SP485

The **SP481**, **SP483**, and **SP485** receivers have differential inputs with an input sensitivity as low as $\pm 200 \text{mV}$. Input impedance of the receivers is typically $15 \text{k}\Omega$ ($12 \text{k}\Omega$ minimum). A wide common mode range of -7V to +12V allows for large ground potential differences between systems. The receivers of the **SP481**, **SP483** and **SP485** have a tri-state enable control pin. A logic LOW on $\overline{\text{RE}}$ (pin 4) will enable the receiver, a logic HIGH on $\overline{\text{RE}}$ (pin 4) will disable the receiver.

The receiver for the **SP481** and **SP485** will operate up to at least 5Mbps. The **SP483** receiver is rated for data rates up to 250kbps. The receiver for each of the three devices is equipped with the fail-safe feature. Fail-safe guarantees that the receiver output will be in a HIGH state when the input is left unconnected.

Shutdown Mode SP481/SP483

The **SP481** and **SP483** are equipped with a Shutdown mode. To enable the Shutdown state, both the driver and receiver must be disabled simultaneously. A logic LOW on DE (pin 5) and a logic HIGH on $\overline{\text{RE}}$ (pin 4) will put the **SP481** or **SP483** into Shutdown mode. In Shutdown, supply current will drop to typically $1\mu\text{A}$.

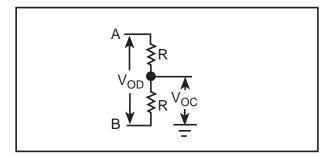


Figure 1. Driver DC Test Load Circuit

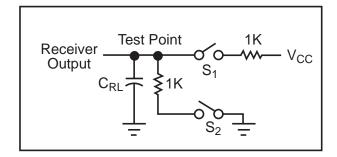


Figure 2. Receiver Timing Test Load Circuit

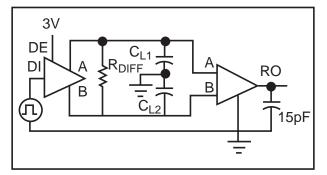


Figure 3. Driver/Receiver Timing Test Circuit

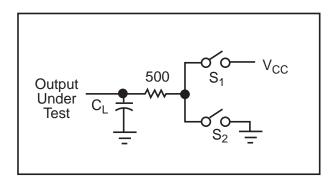


Figure 4. Driver Timing Test Load #2 Circuit

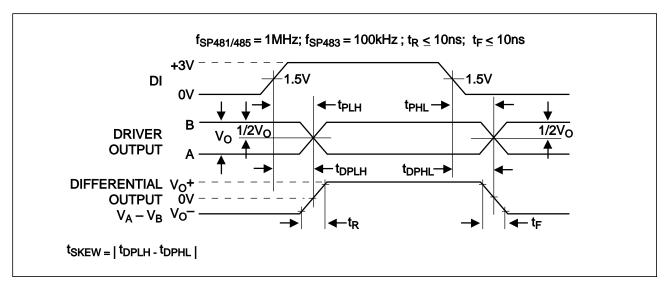


Figure 6. Driver Propagation Delays

I	NPUT	S		OUTI	PUTS
RE	DE	DI	LINE CONDITION	В	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

Table 1. Transmit Function Truth Table

INP	UTS		OUTPUTS
RE	DE	A - B	R
0	0	+0.2V	1
0	0	-0.2V	0
0	0	Inputs Open	1
1	0	X	Z

Table 2. Receive Function Truth Table

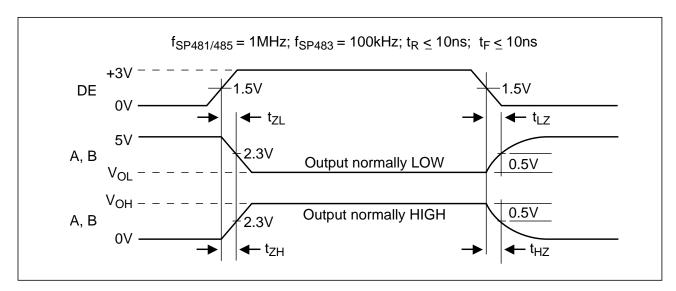


Figure 7. Driver Enable and Disable Times

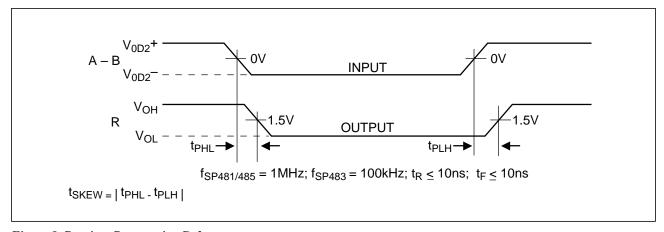


Figure 8. Receiver Propagation Delays

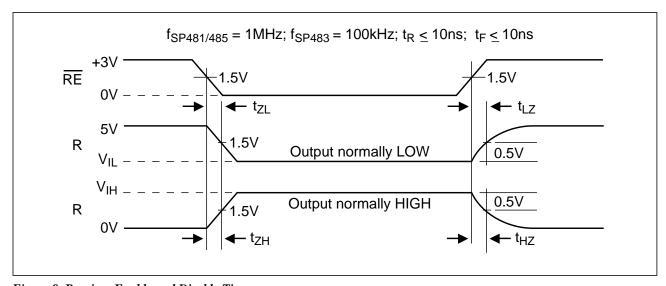
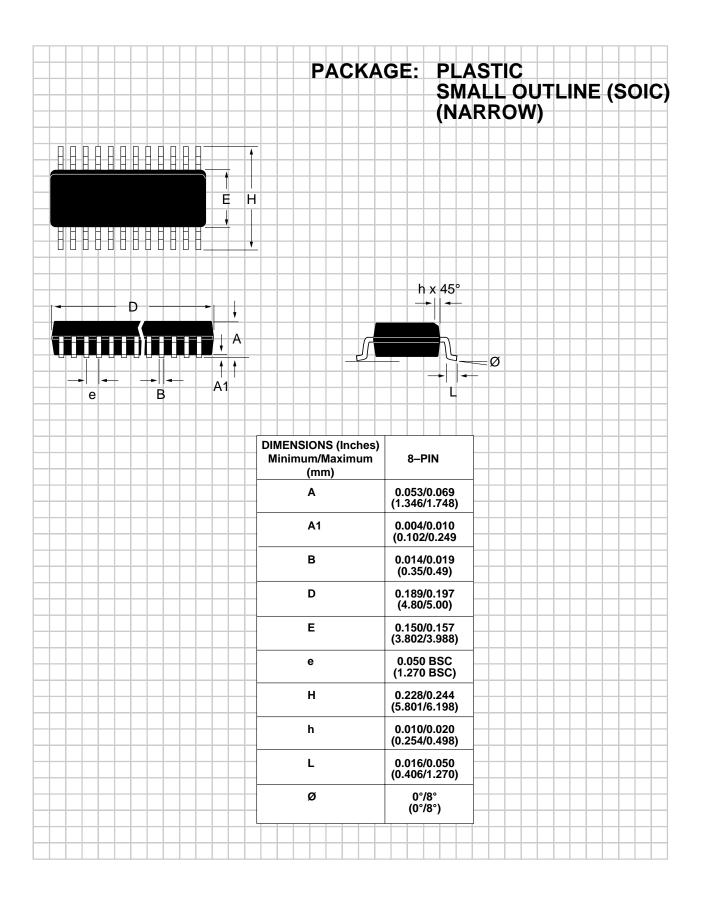
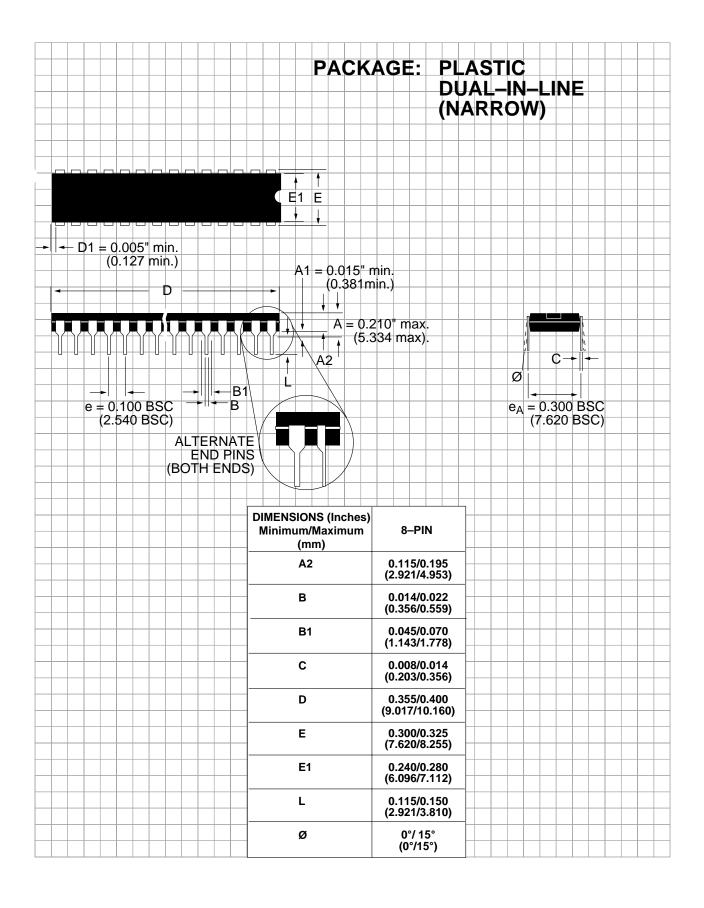


Figure 9. Receiver Enable and Disable Times





ORDERING INFORMATION					
Model	Temperature Range	Package			
SP481CN	0°C to +70°C	8-pin Narrow SOIC			
SP481CS	0°C to +70°C	8-pin Plastic DIP			
SP481EN	40°C to +85°C	8-pin Narrow SOIC			
SP481ES	40°C to +85°C	8-pin Plastic DIP			
SP483CN	0°C to +70°C	8-pin Narrow SOIC			
SP483CS	0°C to +70°C	8-pin Plastic DIP			
SP483EN	-40°C to +85°C	8-pin Narrow SOIC			
SP483ES	-40°C to +85°C	8-pin Plastic DIP			
	0°C to +70°C				
SP485CS	0°C to +70°C	8-pin Plastic DIP			
SP485EN	40°C to +85°C	8-pin Narrow SOIC			
SP485ES	40°C to +85°C	8-pin Plastic DIP			

Please consult the factory for pricing and availability on a Tape-On-Reel option.



SIGNAL PROCESSING EXCELLENCE

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