Philips Components–Signetics

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Data Communication Products	

AM26LS30

Dual differential RS-422 party line/quad single-ended RS-423 line driver

DESCRIPTION

The AM26LS30 is a line driver designed for digital data transmission. A mode control input provides a choice of operation either as two differential line drivers which meet all the requirements of EIA Standard RS-422 or as four independent single-ended RS-423 line drivers.

In the differential mode, the outputs have individual 3-State controls. In the high impedance state, these outputs will not clamp the line over a common mode transmission line voltage of ±10V. A typical full duplex system consists of the AM26LS30 differential line driver and up to twelve AM26LS32 line receivers, or the AM26LS32 line receiver and up to thrity-two AM26LS30 differential drivers.

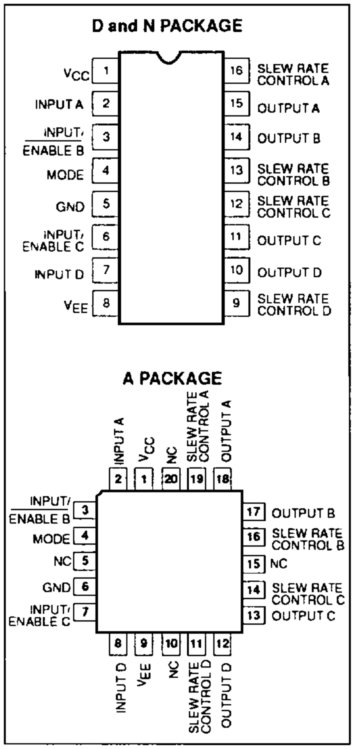
A slew control pin allows the use of an external capacitor to control slew rate for suppression of near-end cross-talk to receivers in the cable.

The AM26LS30 is constructed using high speed oxide isolated bipolar processing.

FEATURES

- Dual RS-422 line driver or quad RS-423 line driver
- Driver outputs do not clamp line with power off or in high impedance state
- Individual 3-State controls when used in differential mode
- Low I_{CC} and I_{EE} power consumption
- RS-422 differential mode: 35mW/ driver typ
- RS-423 single-ended mode: 26mW/ driver typ
- Individual slew rate control for each output
- 50Ω transmission line drive capability (RS-422 into virtual ground)
- Low current PNP inputs compatible with TTL, MOS and CMOS
- High capacitive load drive capability
- Exact replacement for DS16/3691
- High speed oxide isolated bipolar processing

PIN CONFIGURATION



ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
16-Pin Plastic DIP	0°C to +70°C	AM26LS30CN
16-Pin Plastic SO	0°C to +70°C	AM26LS30CD
16-Pin Plastic DIP	-40°C to +85°C	AM26LS30IN
16-Pin Plastic SO	-40°C to +85°C	AM26LS30ID
20-Pin PLCC	0°C to +70°C	AM26LS30CA

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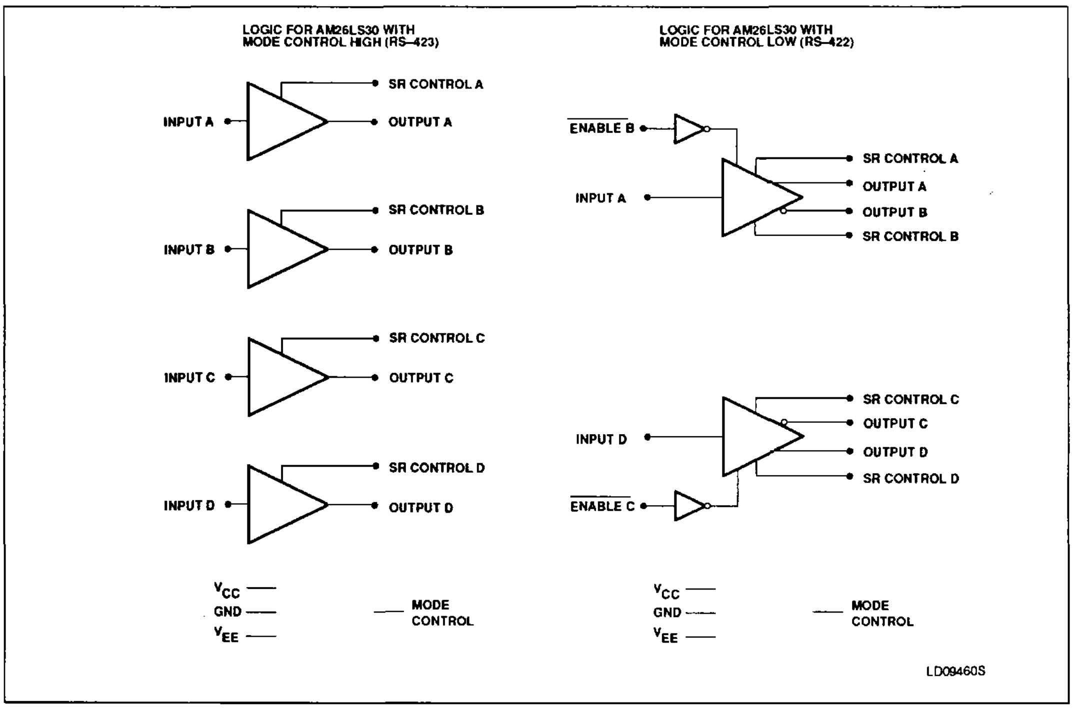
FUNCTION TABLE

	INPUTS		OUTPUTS	
MODE	A(D)	B(C)	A(D)	B(C)
0	0	0	0	1
0	0	1	Z	Z
0	1	0	1	0
0	1	1	Z	Z
1	0	0	0	0
1	0	1	0	1
1	1	0	1	0
1	1	1	1	1

BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS (Above which the useful life may be impaired.)

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	Supply voltage V+	6	V
V_{EE}	V–	–6	V
V_{IN}	Input voltage	–0.5V to V_{CC}	V
V_{OUT}	Output voltage (Power Off)	±13.5	V
T_A	Ambient temperature range AM26LS30C	0 to +70	°C
	AM26LS30I	–40 to +85	°C
T_{STG}	Storage temperature range	–65 to +150	°C
T_{SOLD}	Lead soldering temperature (10sec.)	300	°C
θ_{JA}	Thermal impedance		°C/W

PACKAGE POWER DISSIPATION DERATING TABLE

PACKAGE	POWER DISSIPATION AT T_A = 25°C	DERATING FACTOR ABOVE T_A
N	1,488mW	11.9mW/°C
D	1,262mW	10.1mW/°C

DC ELECTRICAL CHARACTERISTICS

Over the operating temperature range. The following conditions apply unless otherwise specified: AM26LS30C, T_A = 0 to 70°C, V_{CC} = 5.0V ±5%, V_{EE} = GND; AM26LS30I, T_A = –40 to +85°C, V_{CC} = 5.0V ±5%, V_{EE} = GND, RS–423 Connection Mode Voltage ≤2.0V.

SYMBOL[2]	PARAMETER	TEST CONDITIONS[3]		LIMITS Min	Typ[1]	Max	UNIT
V_O	Differential output	$R_L = \infty$	V_{IN} = 2.0V		3.6	6.0	V
$\overline{V_O}$	Voltage, $V_{A,B}$		V_{IN} = 0.8V		–3.6	–6.0	V
V_T	Differential output	R_L = 100Ω	V_{IN} = 2.0V	2.0	2.4		V
$\overline{V_T}$	Voltage, $V_{A,B}$		V_{IN} = 0.8V	–2.0	–2.4		V
V_{OS}, $\overline{V_{OS}}$	Common mode offset voltage	R_L = 100Ω			2.5	3.0	V
$\|V_T\| - \|\overline{V_T}\|$	Difference in common mode output voltage	R_L = 100Ω			0.005	0.4	V
$\|V_{OS}\| - \|\overline{V_{OS}}\|$	Difference in common mode offset voltage	R_L = 100Ω			0.005	0.4	V
V_{SS}	$\|V_T - \overline{V_T}\|$	R_L = 100Ω		4.0	4.8		V
V_{CMR}	Output voltage common mode range	$V_{\overline{ENABLE}}$ = 2.4V		±10			V
I_{XA}	Output leakage current	V_{CC} = 0V	V_{CMR} = 10V		0.5	20	μA
I_{XB}			V_{CMR} = 10V		–0.5	–20	μA
I_{OX}	Off-state (hi-Z) output current	V_{CC} = MAX	V_{CMR} ≤ 10V		0.5	20	μA
			V_{CMR} ≥ –10V		–0.5	–20	μA
I_{OX}	Off-state (hi-Z) output current	V_{CC} = MAX	V_{CMR} ≤ 5V		0.03	1	μA
			V_{CMR} ≥ –5V		–0.03	1	μA
I_{SA}, I_{SB}	Output short circuit current	V_{IN} = 2.4V	V_{OA} = 0V		–75	–150	mA
			V_{OB} = 6V		100	150	mA
		V_{IN} = 0.4V	V_{OA} = 0V		100	150	mA
			V_{OB} = 6V		–75	–150	mA

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DC ELECTRICAL CHARACTERISTICS (Continued)

SYMBOL[2]	PARAMETER	TEST CONDITIONS[3]	LIMITS			UNIT
			Min	Typ[1]	Max	
I_{CC}	Supply current			18	30	mA
V_{IH}	High level input voltage		2.0			V
V_{IL}	Low level input voltage				0.8	V
I_{IH}	High level input current	$V_{IN} = 2.4V$		0.3	40	µA
		$V_{IN} \leq V_{CC}$		0.3	100	µA
I_{IL}	Low level input current	$V_{IN} = 0.4V$		−10	−200	µA
V_I	Input clamp voltage	$I_{IN} = -12mA$			−1.5	V

NOTES:
1. Typical limits are at V_{CC} = 5V, V_{EE} = GND, 25°C ambient and maximum loading.
2. Symbols and definitions correspond to EIA RS-422 where applicable.
3. R_L connected between each output and its complement.

AC ELECTRICAL CHARACTERISTICS **EIA RS-423 Connection,** V_{CC} = 5.0V, V_{EE} = −5V, Mode = 2.4V, T_A = 25°C

SYMBOL[2]	PARAMETER	TEST CONDITIONS[3]	LIMITS			UNIT
			Min	Typ[1]	Max	
t_R	Rise time	R_L = 100Ω, C_L = 500pF, Figure 1		80	200	ns
t_F	Fall time	R_L = 100Ω, C_L = 500pF, Figure 1		110	200	ns
t_{PDH}	Output propagation delay	R_L = 100Ω, C_L = 500pF, Figure 1		90	200	ns
t_{PDL}	Output propagation delay	R_L = 100Ω, C_L = 500pF, Figure 1		95	200	ns
t_{PLZ}	Output enable to output	R_L = 450Ω, C_L = 500pF, Figure 2			0.8	ns
t_{PHZ}				60	350	ns
t_{PZL}	Output enable to output	R_L = 450Ω, C_L = 500pF, Figure 2		140	350	ns
t_{PZH}				120	300	ns

NOTES:
1. Typical limits are at V_{CC} = 5V, V_{EE} = GND, 25°C ambient and maximum loading.
2. Symbols and definitions correspond to EIA RS-422 where applicable.
3. R_L connected between each output and its complement.

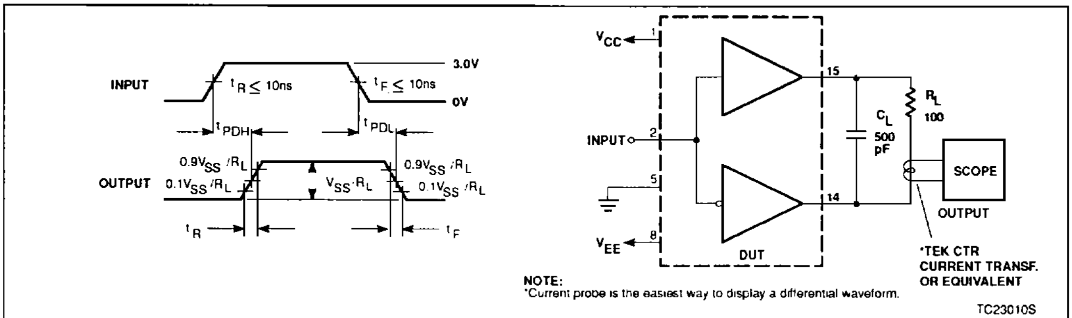

Figure 1. Switching Time Waveforms and AC Test Circuits for EIA RS-422 Connection

Dual differential RS-422 party/line quad single-ended RS-423 line driver

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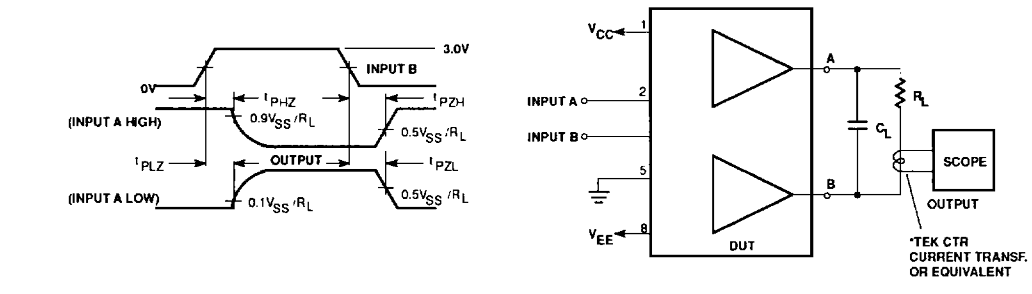

Figure 2. 3-State Delays

DC ELECTRICAL CHARACTERISTICS

Over the operating temperature range The following conditions apply unless otherwise specified. AM26LS30C, T_A = 0 to 70°C, V_{CC} = 5.0V ±5%, V_{EE} = GND; AM26LS30I, T_A = −40 to +85°C, V_{CC} = 5.0V ±5%, V_{EE} = GND, RS-422 Connection Mode Voltage ≤0.8V.

SYMBOL[2]	PARAMETER	TEST CONDITIONS		LIMITS Min	LIMITS Typ[1]	LIMITS Max	UNIT
V_O	Output voltage	$R_L = \infty$[3] $\|V_{CC}\| = \|V_{EE}\|$ = 4.75V	V_{IN} = 2.4V	4.0	4.1	6.0	V
$\overline{V_O}$			V_{IN} = 0.4V	−4.0	−4.2	−6.0	V
V_T	Output voltage	$R_L = 450\Omega$ $\|V_{CC}\| = \|V_{EE}\|$ = 4.75V	V_{IN} = 2.4V	3.6	3.9		V
$\overline{V_T}$			V_{IN} = 0.4V	−3.6	−3.9		V
$\|V_T\| - \|\overline{V_T}\|$	Output unbalance	$\|V_{CC}\| = \|V_{EE}\|$, $R_L = 450\Omega$			0.05	0.4	V
I_{X+}	Output leakage power off	$V_{CC} = V_{EE} = 0$	V_O = 6V		0.5	20	μA
I_{X-}			V_O = −6V		−0.5	−20	μA
I_{S+}	Output short circuit current	V_O = 0V	V_{IN} = 2.4V		−75	−150	mA
I_{S-}			V_{IN} = 0.4V		100	150	mA
I_{SLEW}	Slew control current	$V_{SLEW} = V_{EE}$ + 0.9V			±125	20	μA
I_{CC}	Positive supply current	V_{IN} = 0.4V, $R_L = \infty$			18	30	mA
I_{EE}	Negative supply current	V_{IN} = 0.4V, $R_L = \infty$			−8	−22	mA
V_{IH}	High level input voltage			2.0			V
V_{IL}	Low level input voltage					0.8	V
I_{IH}	High level intput current	V_{IN} = 2.4V			0.3	40	μA
		$V_{IN} \leq V_{CC}$			0.3	100	μA
I_{IL}	Low level input current	V_{IN} = 0.4V			−10	−200	μA
V_I	Input clamp voltage	I_{IN} = −12mA				−1.5	V

NOTES:
1. Typical limits are at V_{CC} = 5.0V, V_{EE} = −5V, 25°C ambient and maximum loading
2. Symbols and definitions correspond to EIA RS-423 where applicable.
3. Output voltage is +3.9V minimum and −3.9V minimum at −40°C.

AC ELECTRICAL CHARACTERISTICS EIA RS-422 Connection, V_{CC} = 5.0V, V_{EE} = GND, Mode = 0.4V, T_A = 25°C

SYMBOL[2]	PARAMETER	TEST CONDITIONS[3]		LIMITS			UNIT
				Min	Typ[1]	Max	
t_R	Rise time	R_L = 450Ω, C_L = 500pF,	C_C = 0pF		110	300	ns
		Figure 3	C_C = 50pF		3.0		μs
t_F	Fall time	R_L = 450Ω, C_L = 500pF,	C_C = 0pF		120	300	ns
		Figure 3	C_C = 50pF		3.0		μs
S_{RC}	Slew rate coefficient	R_L = 450Ω, C_L = 500pF, Figure 3			0.06		μs/pF
t_{PDH}	Output propagation delay	R_L = 450Ω, C_L = 500pF, Figure 3 C_C = 0pF			110	300	ns
t_{PDL}	Output propagation delay	R_L = 450Ω, C_L = 500pF, Figure 3 C_C = 0pF			120	300	ns

NOTES:
1. Typical limits are at V_{CC} = 5.0V, V_{EE} = –5V, 25°C ambient and maximum loading.
2. Symbols and definitions correspond to EIA RS-423 where applicable.
3. Output voltage is +3.9V minimum and –3.9V minimum at –40°C

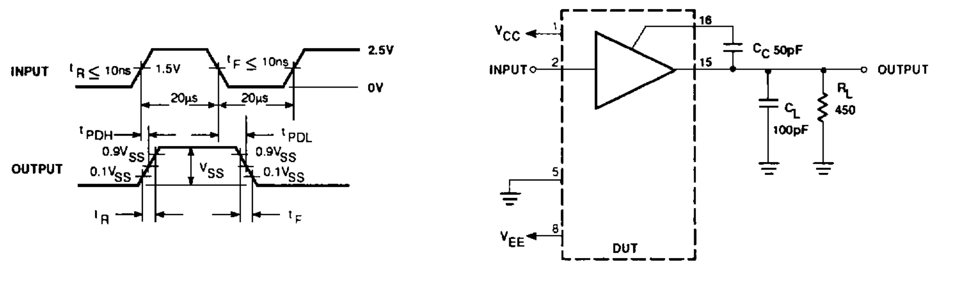

Figure 3. Switching Time Waveforms and AC Test Circuits for EIA RS-423 Connection

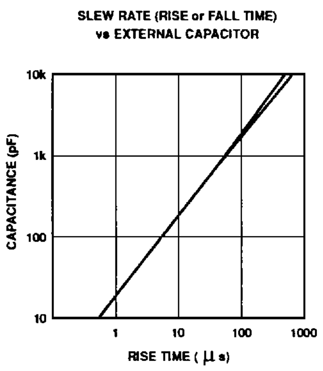

Figure 4.

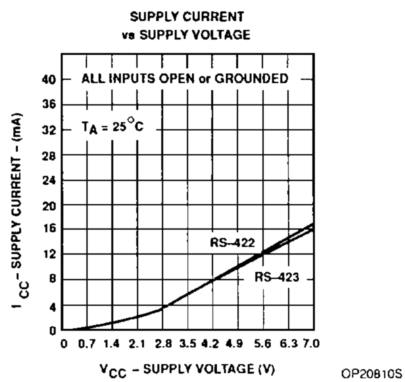

Figure 5.

Dual differential RS-422 party/line quad single-ended RS-423 line driver

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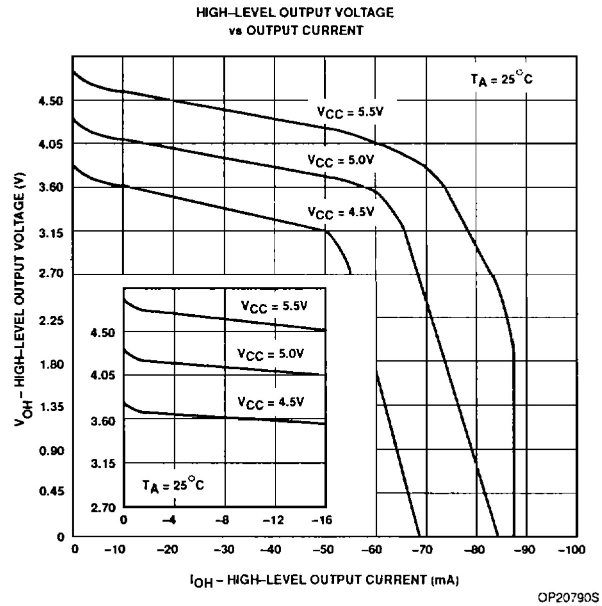

Figure 6.

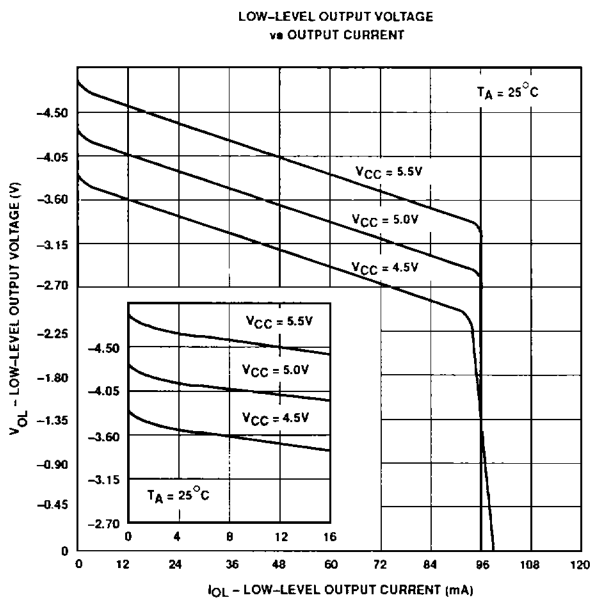

Figure 7.