



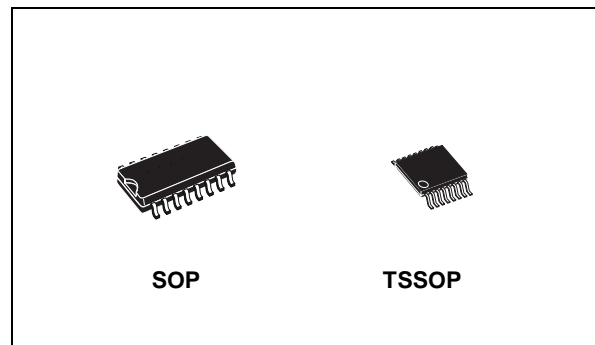
# STLVDS31

## HIGH SPEED DIFFERENTIAL LINE DRIVERS

- MEETS OR EXCEEDS THE REQUIREMENTS OF ANSI TIA/EIA-644 STANDARD
- LOW VOLTAGE DIFFERENTIAL SIGNALING WITH TYPICAL OUTPUT VOLTAGE OF 350mV AND A 100Ω LOAD
- TYPICAL OUTPUT VOLTAGE RISE AND FALL TIMES OF 750ps (400Mbps)
- TYPICAL PROPAGATION DELAY TIMES OF 1.7ns
- OPERATES FROM A SINGLE 3.3V SUPPLY
- POWER DISSIPATION 25mW TYPICAL PER DRIVER AT 200MHz
- DRIVER AT HIGH IMPEDANCE WHEN DISABLED OR WITH  $V_{CC} = 0V$
- PIN COMPATIBLE WITH THE AM26LS31, SN65LVD31
- LOW VOLTAGE TTL (LVTTTL) LOGIC INPUT LEVELS

### DESCRIPTION

The STLVDS31 is a quad differential line drivers that implements the electrical characteristics of low voltage differential signaling (LVDS). This signaling technique lowers the output voltage levels of 5V differential standard levels (such as TIA/EIA-422B) to reduce the power, increase the switching speeds and allows operations with a



3.3V supply rail. Any of the four current mode drivers will deliver a minimum differential output voltage magnitude of 247mV into a 100Ω load when enabled.

The intended application of this device and signalling technique is for point-to-point baseband data transmission over controlled impedance media approximately 100Ω. The transmission media may be printed circuit board traces, backplanes or cables. The ultimate rate and distance of data transfer is dependent upon the attenuation characteristics of the media and noise coupling to the environment.

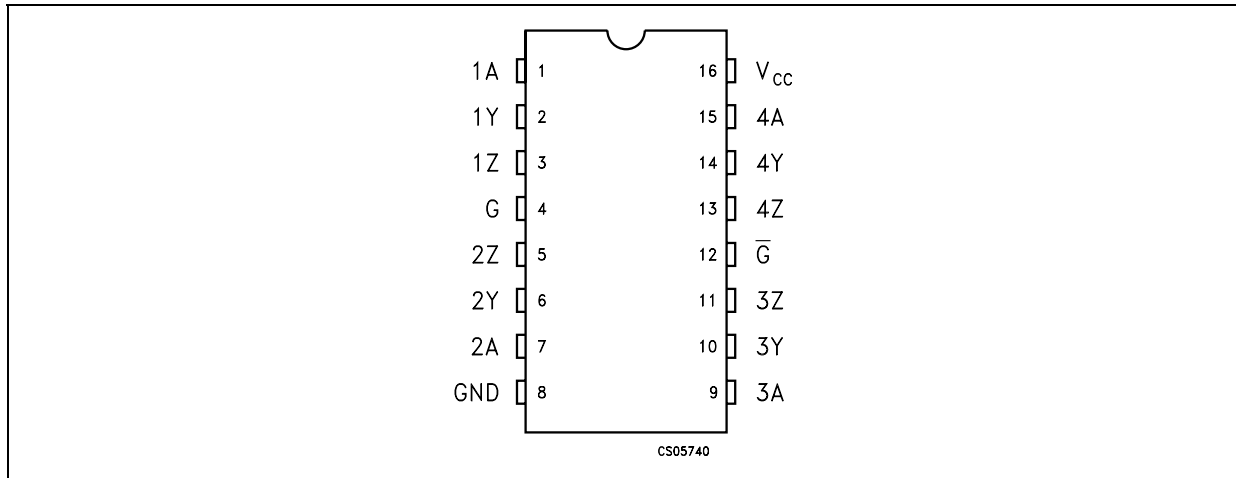
The STLVDS31 is characterized for operation from -40°C to 85°C.

### ORDERING CODES

Type	Temperature Range	Package	Comments
STLVDS31BD	-40 to 85 °C	SO-16 (Tube)	50parts per tube / 20tube per box
STLVDS31BDR	-40 to 85 °C	SO-16 (Tape & Reel)	2500 parts per reel
STLVDS31BTR	-40 to 85 °C	TSSOP16 (Tape & Reel)	2500 parts per reel

# STLVDS31

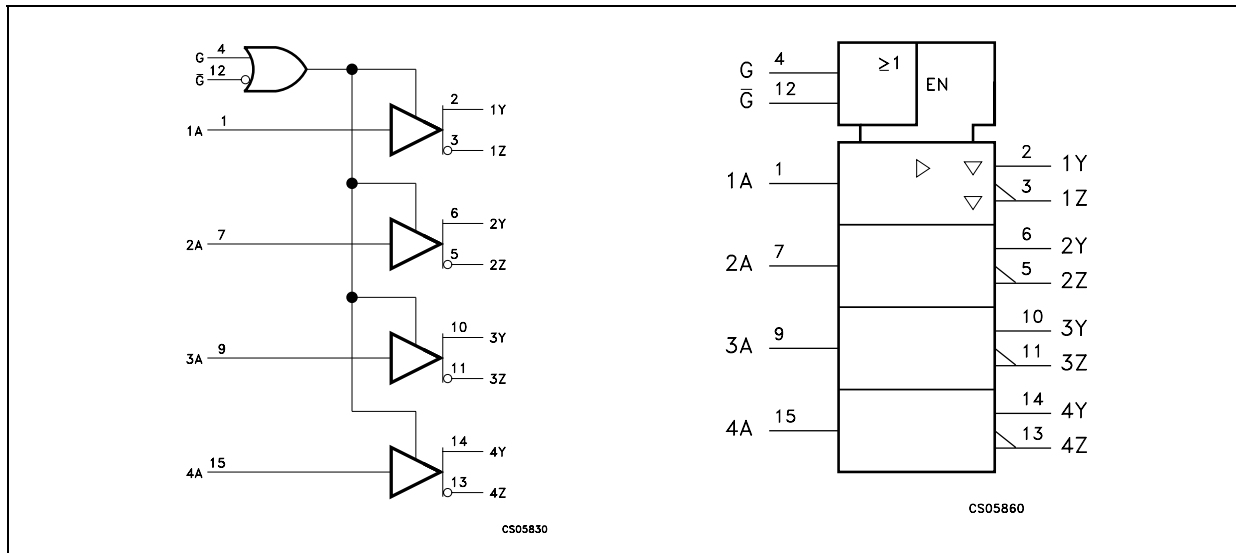
## PIN CONFIGURATION



## PIN DESCRIPTION

PIN N°	SYMBOL	NAME AND FUNCTION
1, 7, 9, 15	1A to 4A	Driver Inputs
2, 6, 10, 14	1Y to 4Y	Driver Outputs
3, 5, 11, 13	1Z to 4Z	Driver Outputs
4	G	Enable
12	G-bar	Enable
8	GND	Ground
16	V <sub>CC</sub>	Supply Voltage

## LOGIC DIAGRAM AND LOGIC SYMBOL



## TRUTH TABLE

INPUT	ENABLES		OUTPUTS	
A	G	$\overline{G}$	Y	Z
H	H	X	H	L
L	H	X	L	H
H	X	L	H	L
L	X	L	L	H
X	L	H	Z	Z
OPEN	H	X	L	H
OPEN	X	L	L	H

L=Low level, H=High Level, X=Don't care, Z= High Impedance

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage (Note 1)	-0.5 to 4.6	V
$V_I$	DC Input Voltage	-0.5 to ( $V_{CC} + 0.5$ )	V
$T_{stg}$	Storage Temperature Range	-65 to +150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Note 1: All voltages except differential I/O bus voltage, are with respect to the network ground terminal.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min.	Typ.	Max.	Unit
$V_{CC}$	Supply Voltage	3.0	3.3	3.6	V
$V_{IH}$	HIGH Level Input Voltage	2.0			V
$V_{IL}$	LOW Level Input Voltage			0.8	V
$T_A$	Operating Temperature Range	-40		85	°C

## STLVDS31

**ELECTRICAL CHARACTERISTICS** (Over recommended operating conditions unless otherwise noted. All typical values are at  $T_A = 25^\circ\text{C}$ , and  $V_{CC} = 3.3\text{V}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{OD}$	Differential Output Voltage	$R_L = 100\Omega$ Fig. 2	247	350	454	mV
$\Delta V_{OD}$	Change in Differential Output Voltage Between Logic State		-50		50	mV
$\Delta V_{OC(SS)}$	Change in Steady-state Common Mode Output Voltage Between Logic State	Fig. 3	1.125	1.2	1.375	V
$V_{OC(SS)}$	Steady-state Common Mode Output Voltage	Fig. 3	-50		50	mV
$V_{OC(PP)}$	Peak to Peak Common mode Output Voltage			80	150	mV
$I_{CC}$	Supply Current	$V_{IN} = 0.8\text{V}$ or $2\text{V}$ , Enabled, No Load		11.5	20	mA
		$V_{IN} = 0.8\text{V}$ or $2\text{V}$ , Enabled, $R_L = 100\Omega$		25	35	mA
		$V_{IN} = 0$ or $V_{CC}$ , Disabled		0.3	1	mA
$I_{IH}$	High Level Input Current	$V_{IH} = 2\text{V}$		4	20	$\mu\text{A}$
$I_{IL}$	Low Level Input Current	$V_{IL} = 0.8\text{V}$		0.6	10	$\mu\text{A}$
$I_{SC}$	Short Circuit Output Current	$V_{O(Y)}$ or $V_{O(Z)} = 0\text{V}$		6.1	-24	mA
		$V_{OD} = 0$			$\pm 12$	mA
$I_{OZ}$	High Impedance Output Current	$V_O = 0$ or $2.4\text{V}$			$\pm 1$	$\mu\text{A}$
$I_{OFF}$	Power OFF Output Current	$V_{CC} = 0$ $V_O = 2.4\text{V}$			$\pm 1$	$\mu\text{A}$
$C_{IN}$	Input Capacitance			3		pF

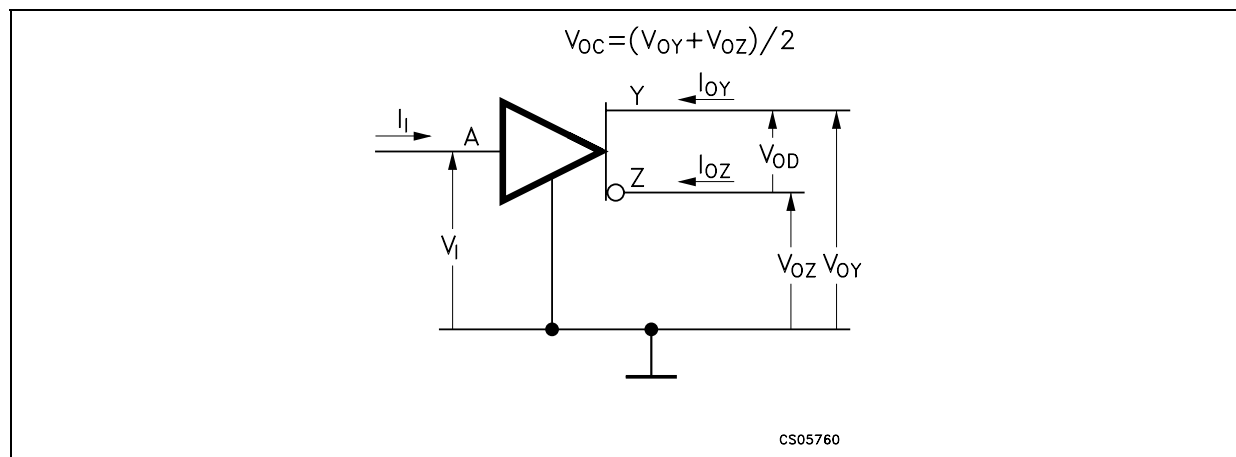
**SWITCHING CHARACTERISTICS** (Unless otherwise noted. Typical values are referred to  $T_A = 25^\circ\text{C}$  and  $V_{CC} = 3.3\text{V}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{PLH}$	Propagation Delay Time, Low to High Output	$R_L = 100\Omega$ $C_L = 10\text{pF}$ Fig. 2	0.5	1.4	2	ns
$t_{PHL}$	Propagation Delay Time, High to Low Output		1	1.7	2.5	ns
$t_r$	Differential Output Signal Rise Time		0.4	0.5	0.6	ns
$t_f$	Differential Output Signal Fall Time		0.4	0.5	0.6	ns
$t_{sk(P)}$	Pulse Skew ( $t_{THL} = t_{TLH}$ )			0.3	0.6	ns
$t_{sk(O)}$	Channel to Channel Output Skew (note1)			0	0.3	ns
$t_{PZH}$	Propagation Delay Time, High Impedance to High Level Output	Fig. 4		5.4	15	ns
$t_{PZL}$	Propagation Delay Time, High Impedance to Low Level Output			2.5	15	ns
$t_{PHZ}$	Propagation Delay Time, High Level to High Impedance Output			8.1	15	ns
$t_{PLZ}$	Propagation Delay Time, Low Level to High Impedance Output			7.3	15	ns

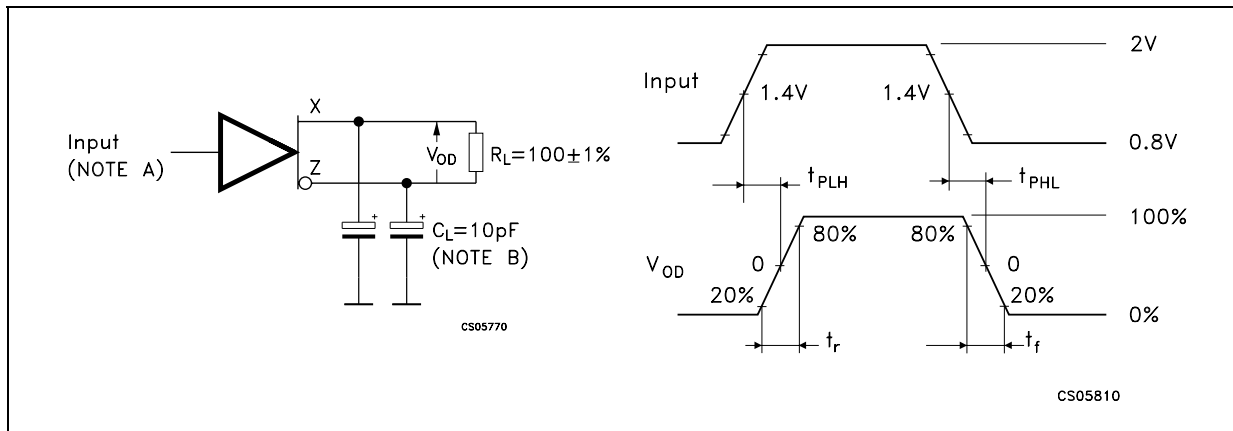
Note 1:  $t_{sk(O)}$  is the maximum delay time difference between drivers on the same device.

Note 2: RS-232 IN to TTL-CMOS OUT (from 50% to 50%)

**Figure 1 : Voltage and Current Definitions**

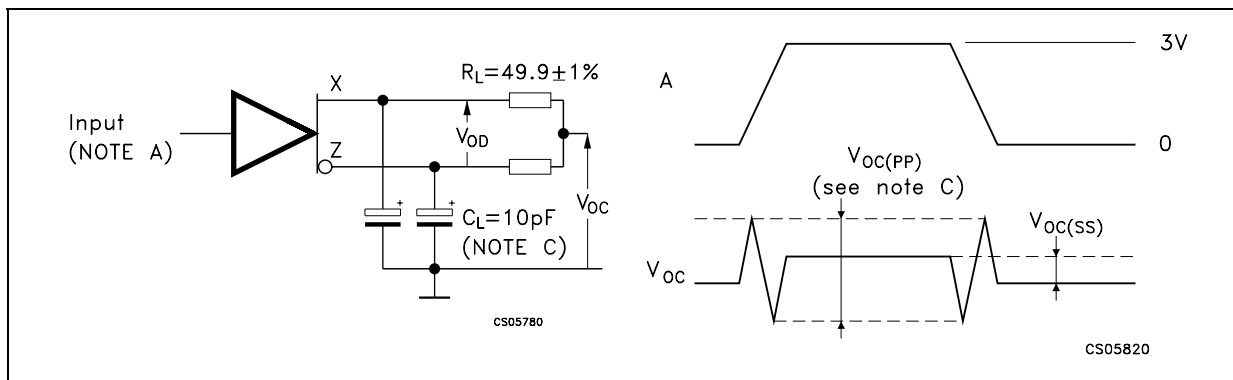


**Figure 2 : Test Circuit, Timing And Voltage Definitions For Differential Output Signal**



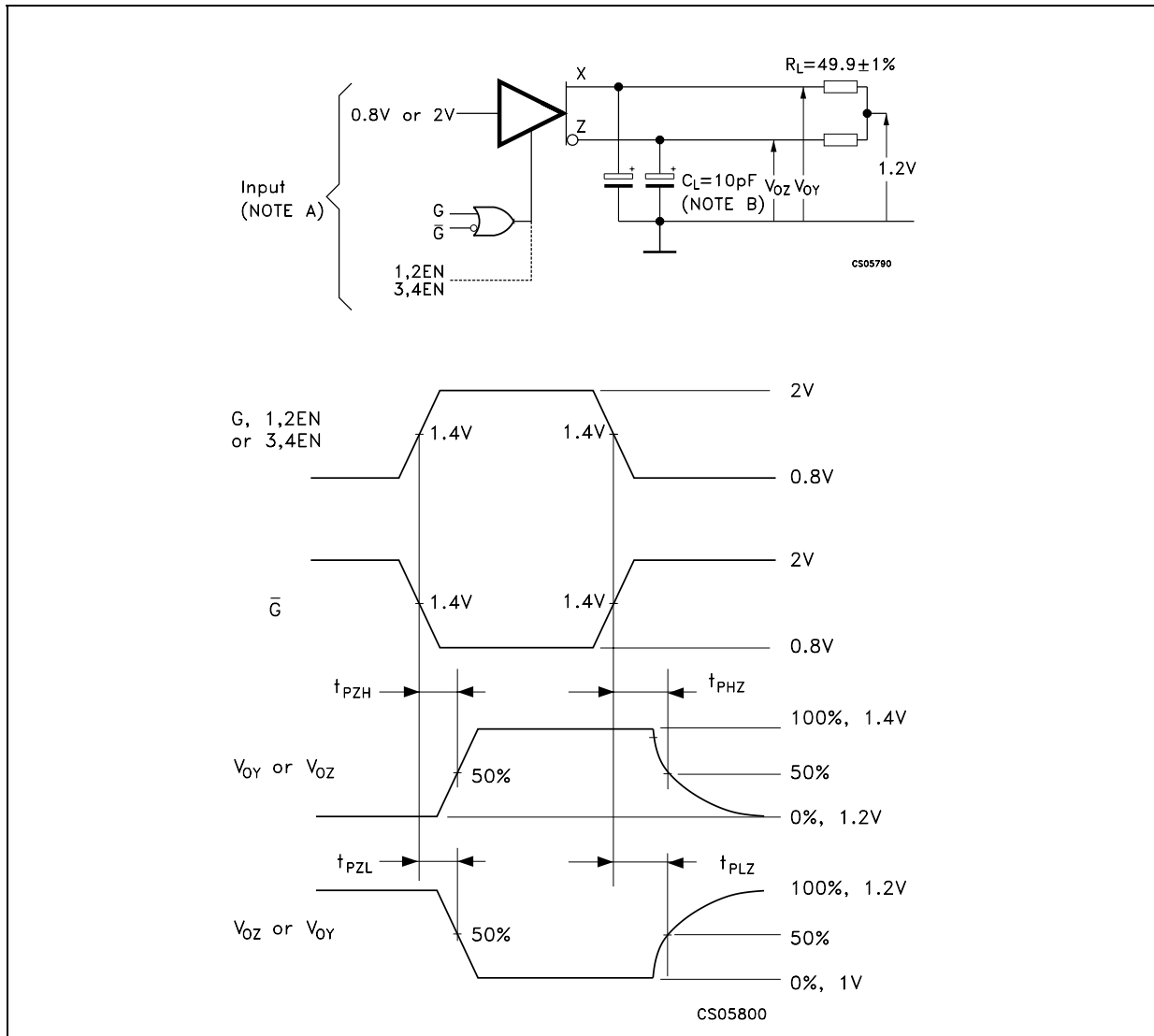
Note A: All input pulse are supplied by a generator having the following characteristics:  $t_r$  or  $t_f \leq 1\text{ns}$ , pulse repetition rate (PRR) = 50Mpps, pulse width =  $10 \pm 0.2\text{ns}$ .  
 Note B:  $C_L$  includes instrumentation and fixture capacitance within 6mm of the D.U.T.

**Figure 3 : Test Circuit And Definitions For The Driver Common Mode Output Voltage**



Note A: All input pulse are supplied by a generator having the following characteristics:  $t_r$  or  $t_f \leq 1\text{ns}$ , pulse repetition rate (PRR) = 50Mpps, pulse width =  $10 \pm 0.2\text{ns}$ .  
 Note B:  $C_L$  includes instrumentation and fixture capacitance within 6mm of the D.U.T.  
 Note C: The measurement of  $V_{OC}(PP)$  is made on test equipment with a -3dB bandwidth of at least 300MHz

Figure 4 : Enable And Disable Time Test Circuit And Waveform



Note A: All input pulse are supplied by a generator having the following characteristics:  $t_r$  or  $t_f \leq 1 \text{ ns}$ , pulse repetition rate (PRR) = 0.5Mpps, pulse width =  $500 \pm 10 \text{ ms}$ .

Note B:  $C_L$  includes instrumentation and fixture capacitance within 6mm of the D.U.T.

TYPICAL PERFORMANCE CHARACTERISTICS (unless otherwise specified  $T_j = 25^\circ\text{C}$ )

Figure 5 : Supply Current vs Temperature

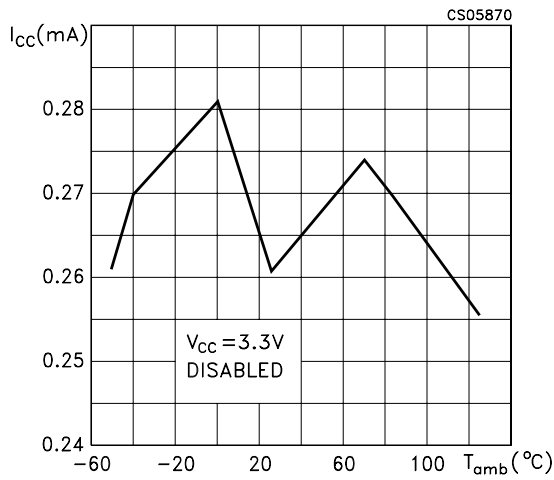


Figure 6 : Supply Current vs Temperature

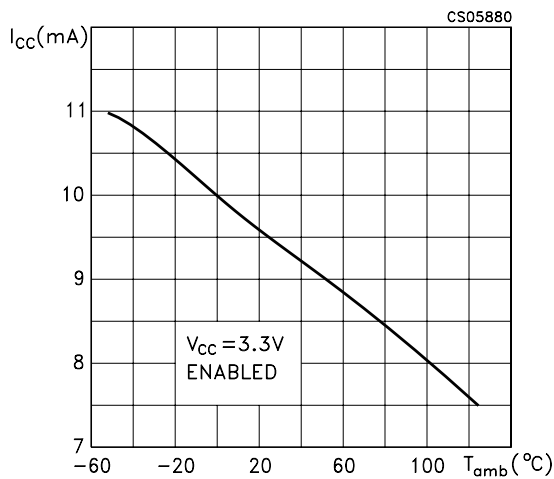


Figure 7 : Propagation Delay Enable to Output

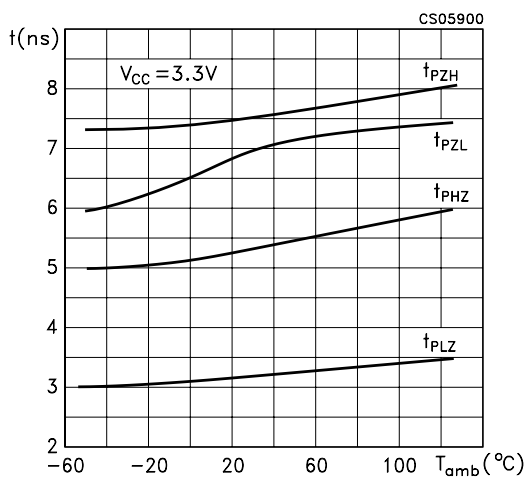


Figure 8 : Propagation Delay Time

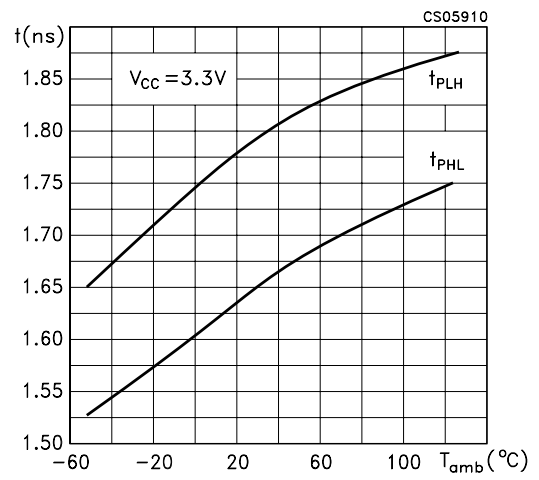
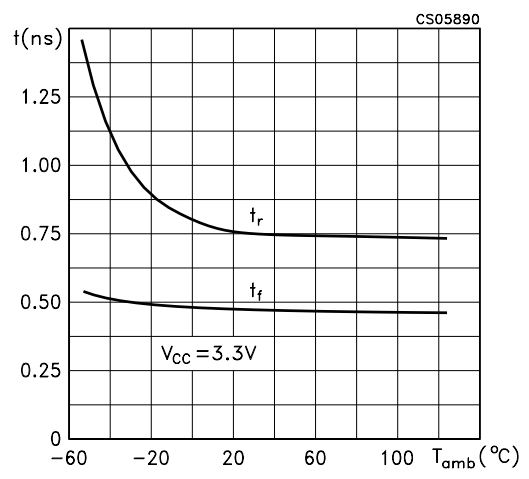


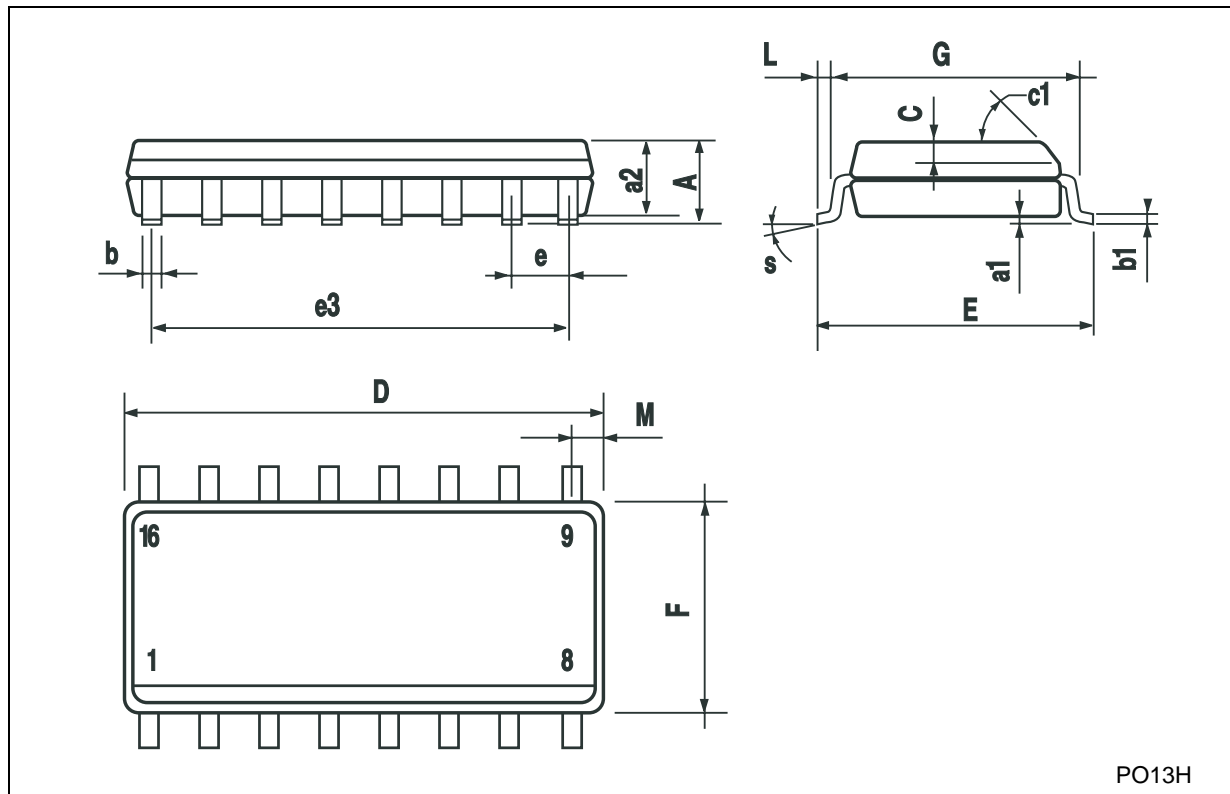
Figure 9 : Differential Output Signal





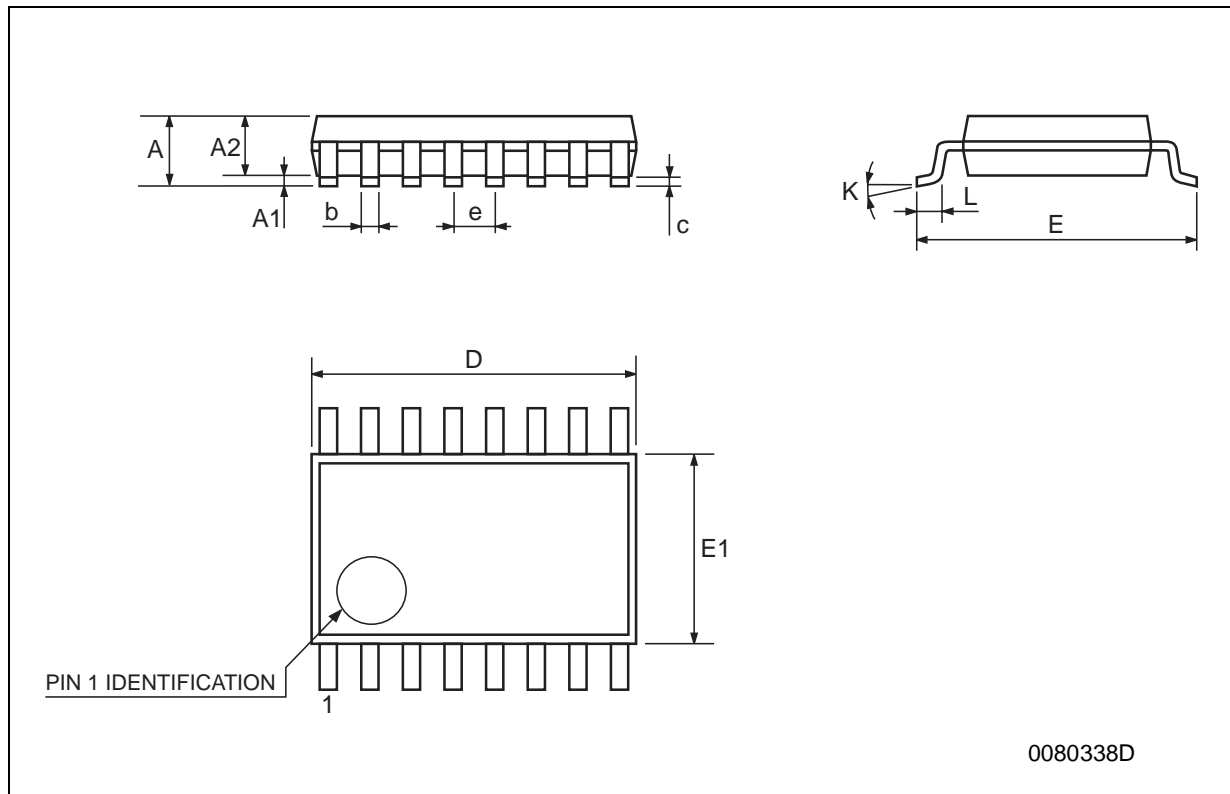
## SO-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.004		0.008
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S	8			° (max.)		



## TSSOP16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0079
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030



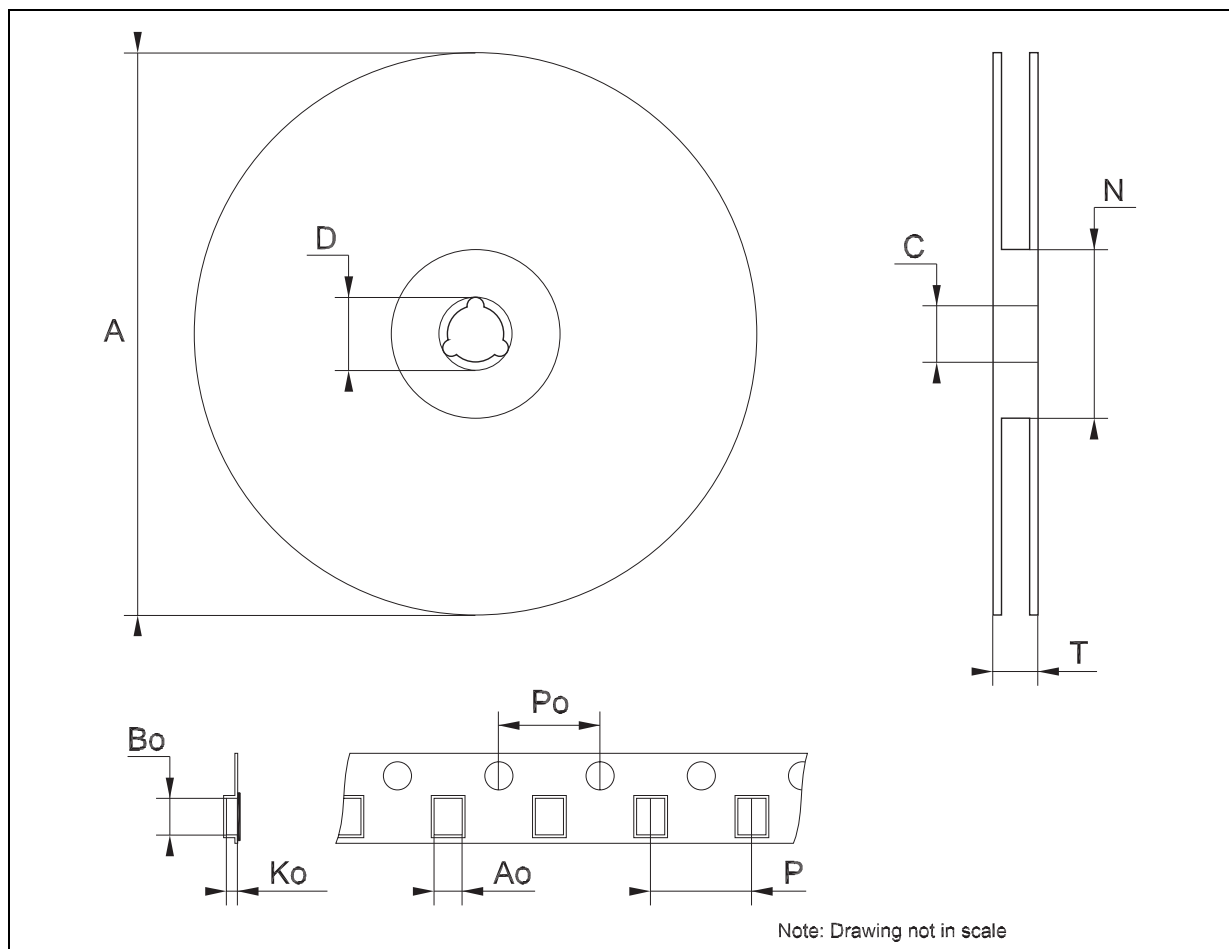
## Tape &amp; Reel SO-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.45		6.65	0.254		0.262
Bo	10.3		10.5	0.406		0.414
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



**Tape & Reel TSSOP16 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.7		6.9	0.264		0.272
Bo	5.3		5.5	0.209		0.217
Ko	1.6		1.8	0.063		0.071
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



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