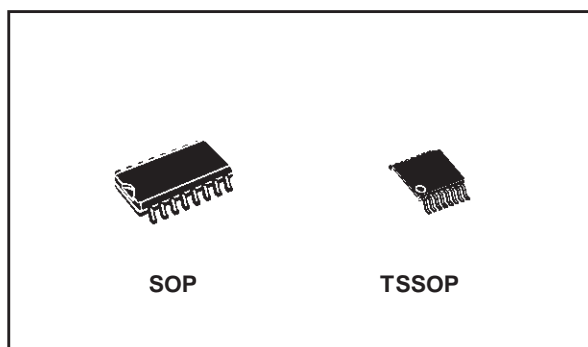# STLVDS31
STLVDS3487

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, MC3487 AND SN65LVD3487
- LOW VOLTAGE TTL (LVTTL) LOGIC INPUT LEVELS

SOP   TSSOP

DESCRIPTION

The STLVDS31 and STLVDS3487 are 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.
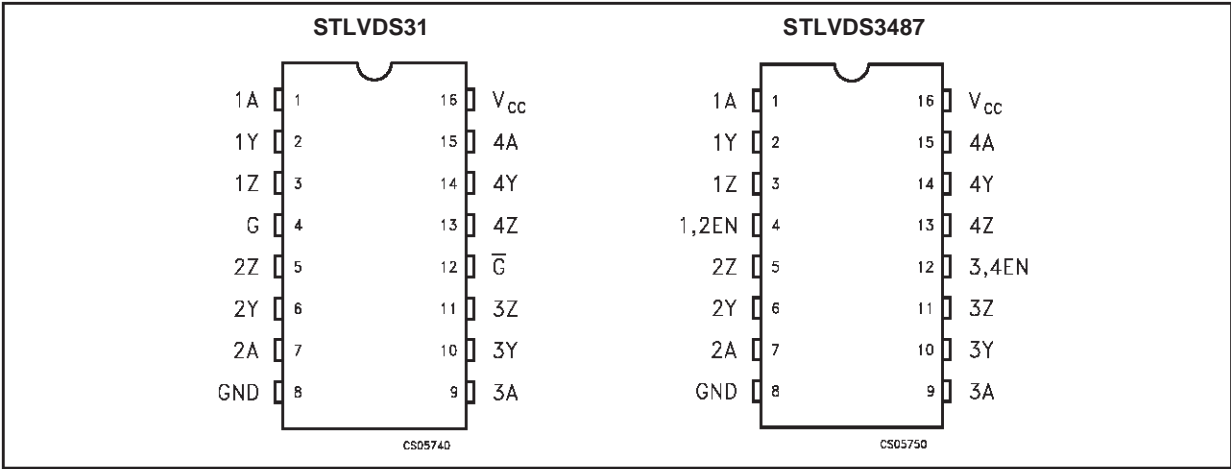
The indended application of this device and signalling tecnique is for point-to-point baseband data transmission over controlled impedance media approximately 100Ω. The transmission media may be printed circuit board traces, backplanes or cables. The ultimate rate and distance of data transfer is dependent upon the attenuation characteristics of the media and noise coupling to the enviroment.

The STLVDS31 and STLVDS3487 are 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
STLVDS3487BD	-40 to 85 °C	SO-16 (Tube)	50parts per tube / 20tube per box
STLVDS3487BDR	-40 to 85 °C	SO-16 (Tape & Reel)	2500 parts per reel
STLVDS3487BTR	-40 to 85 °C	TSSOP16 (Tape & Reel)	2500 parts per reel

PIN CONFIGURATION

STLVDS31

1A	1			16		V_{CC}
1Y	2			15		4A
1Z	3			14		4Y
G	4			13		4Z
2Z	5			12		$\overline{G}$
2Y	6			11		3Z
2A	7			10		3Y
GND	8			9		3A

CS05740

STLVDS3487

1A	1			16		V_{CC}
1Y	2			15		4A
1Z	3			14		4Y
1,2EN	4			13		4Z
2Z	5			12		3,4EN
2Y	6			11		3Z
2A	7			10		3Y
GND	8			9		3A

CS05750

STLVDS31 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	$\overline{G}$	Enable
8	GND	Ground
16	V_{CC}	Supply Voltage

STLVDS3487 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	1,2EN	Drivers 1 and 2 Enable
12	3,4EN	Drivers 3 and 4 Enable
8	GND	Ground
16	V_{CC}	Supply Voltage

LOGIC DIAGRAM AND LOGIC SYMBOL FOR STLVDS31

CS05830

CS05860
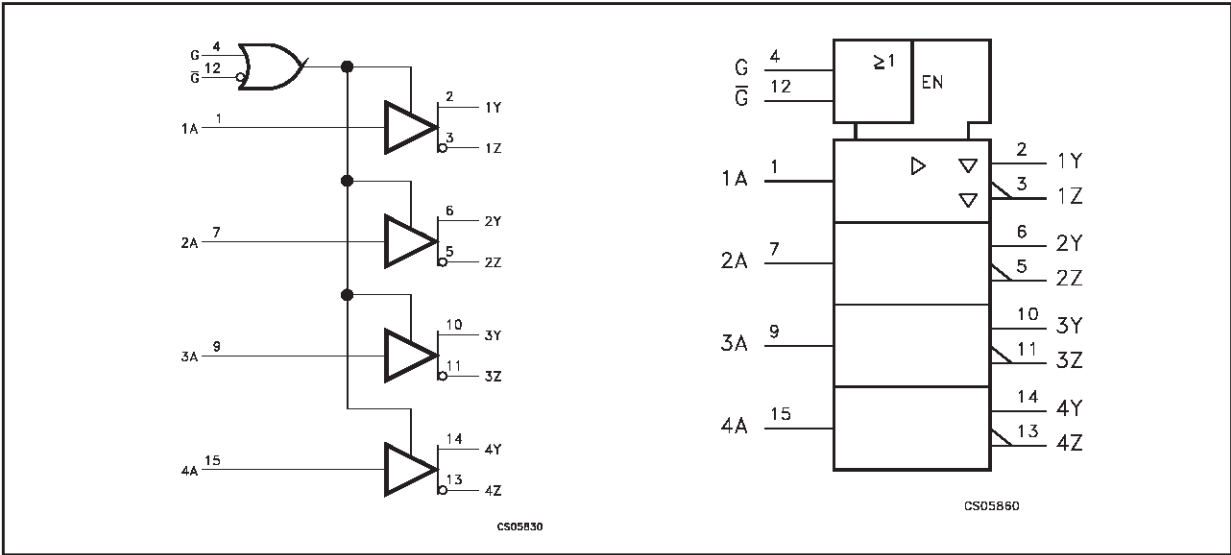
LOGIC DIAGRAM AND LOGIC SYMBOL FOR STLVDS3487

CS05840

CS05B50
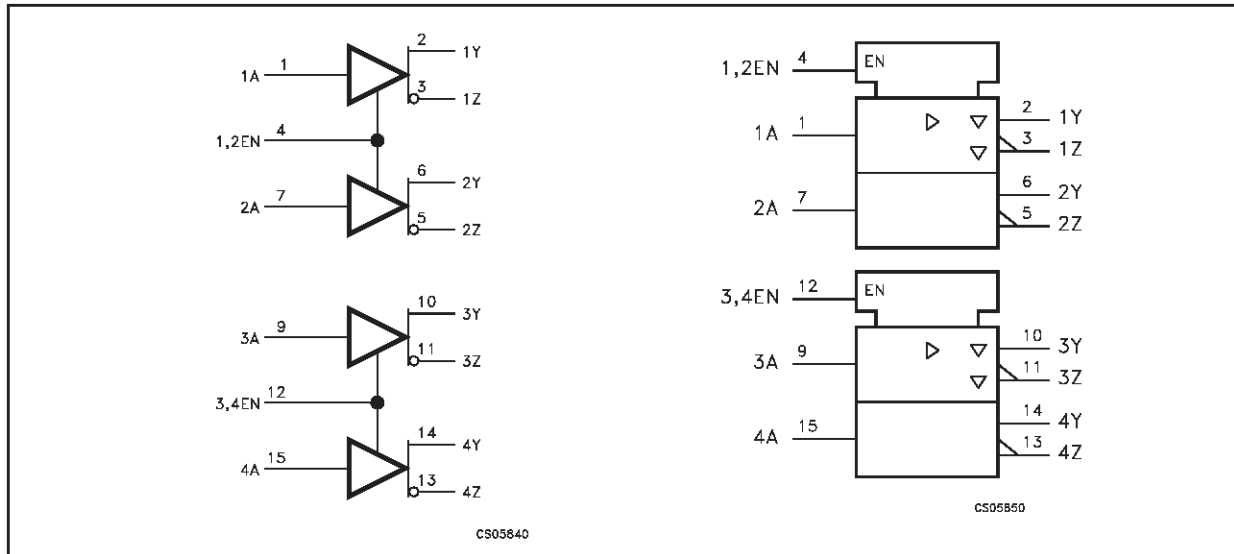
STLVDS31 TRUTH TABLE

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

STLVDS3487 TRUTH TABLE

INPUT	ENABLES	OUTPUTS	
A	**EN**	**Y**	**Z**
H	H	H	L
L	H	L	H
X	L	Z	Z
OPEN	H	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_{ILI}	LOW Level Input Voltage			0.8	V
T_A	Operating Temperature Range	-40		85	°C

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

| Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{OD}	Differential Output Voltage	$R_L = 100\Omega$ Fig. 2	247	350	454	mV
ΔV_{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 Paek Common mode Output Voltage			80	150	mV
I_{CC}	Supply Current	$V_{IN} = 0.8V$ or 2V, Enabled, No Load		11.5	20	mA
		$V_{IN} = 0.8V$ or 2V, 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	$V_{IH} = 2V$		4	20	μA
I_{IL}	Low Level Input Current	$V_{IL} = 0.8V$		0.6	10	μA
I_{SC}	Short Circuit Output Current	$V_{O(Y)}$ or $V_{O(Z)} = 0V$		6.1	-24	mA
		$V_{OD} = 0$			± 12	mA
I_{OZ}	High Impedance Output Current	$V_O = 0$ or 2.4V			± 1	μA
I_{OFF}	Power OFF Output Current	$V_{CC} = 0$ $V_O = 2.4V$			± 1	μA
C_{IN}	Input Capacitance			3		pF

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{PLH}	Propagation Delay Time, Low to High Output	$R_L = 100\Omega$ $C_L = 10pF$ 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.
RNote 1: RS-232 IN to TTL-CMOS OUT (from 50% to 50%)

Figure 1 : Voltage and Current Definitions

$$V_{OC} = (V_{OY} + V_{OZ})/2$$

CS05760
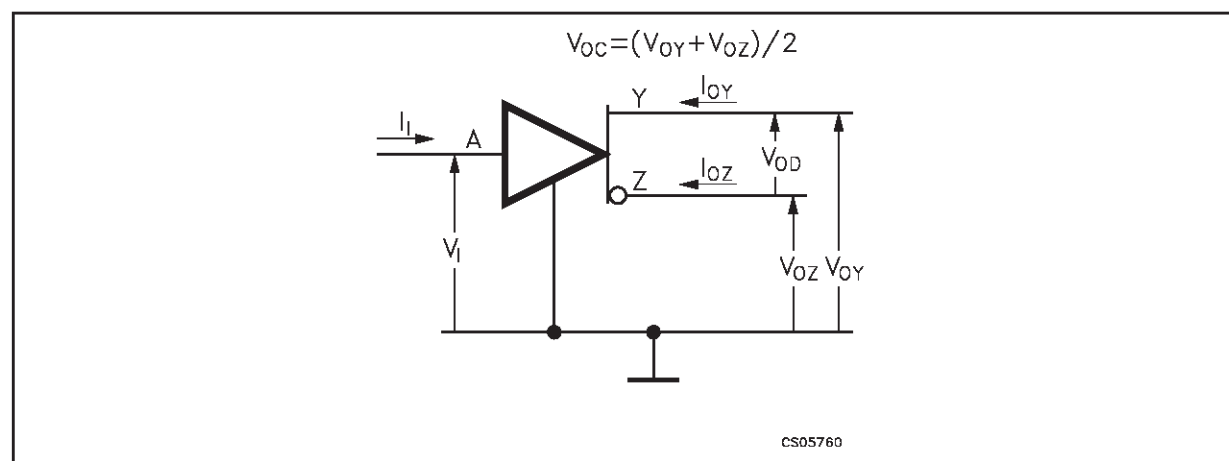
Figure 2 : Test Circuit, Timing And Voltage Definitions For Differential Output Signal
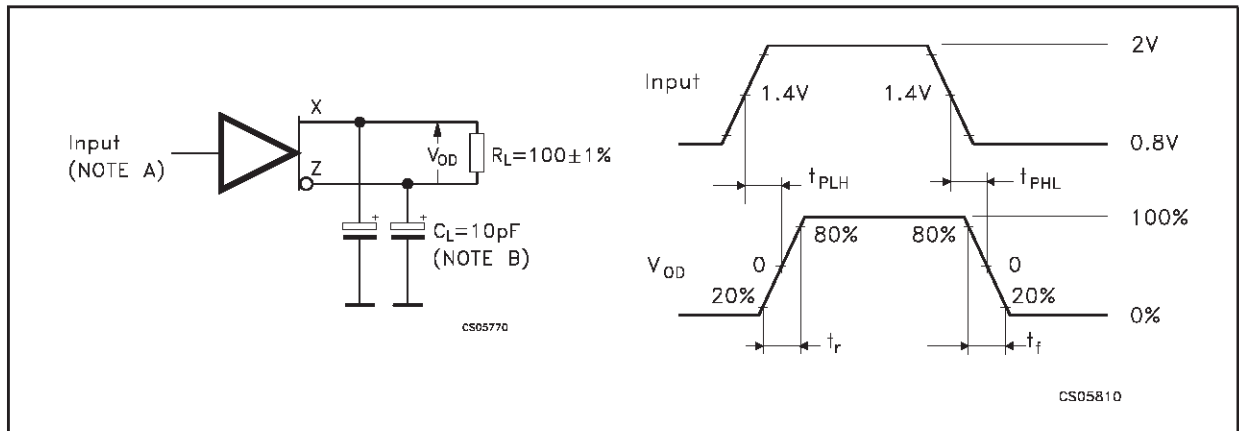
Note A: All input pulse are supplied by a generator having the following characteristics: t_r or $t_f \leq 1$ns, pulse repetition rate (PRR) = 50Mpps, pulse width = 10 ± 0.2ns.
Note B: C_L includes instrumentation and fixture capacitance within 6mm of the D.U.T.

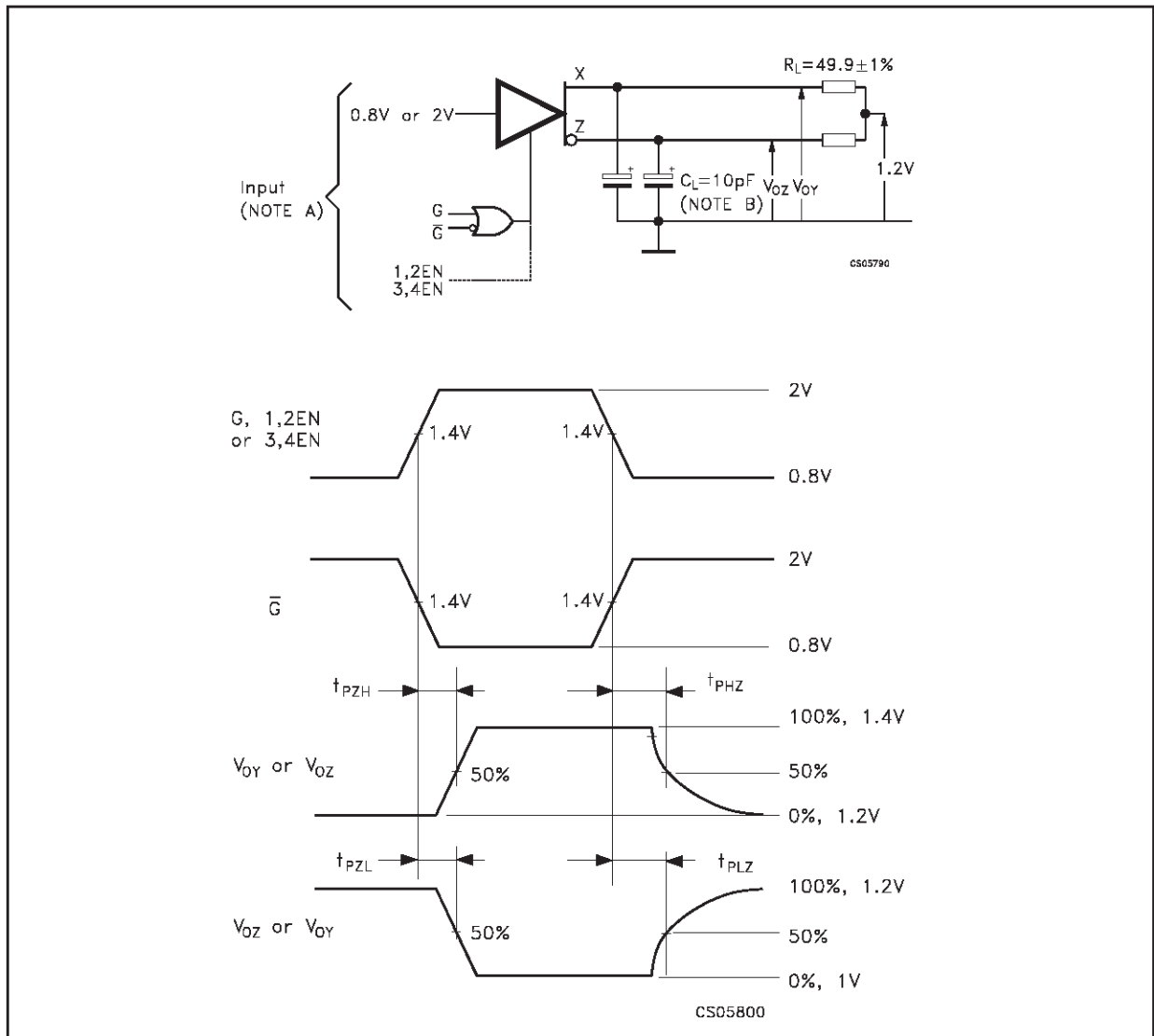**Figure 3 :** Test Circuit And Definitions For The Driver Common Mode Output Voltage
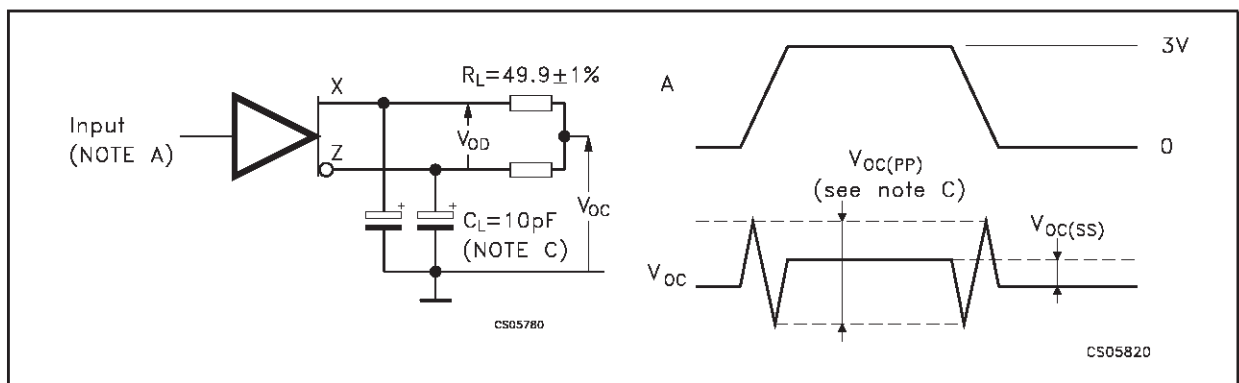
Note A: All input pulse are supplied by a generator having the following characteristics: t_r or $t_f \leq 1$ns, pulse repetition rate (PRR) = 50Mpps, pulse width = 10 ± 0.2ns.
Note B: C_L includes instrumentation and fixture capacitance within 6mm of the D.U.T
Note C: The measurement of VOC(PP) is made on test equipment with a -3dB bandwidth of at least 300MHz

Figure 4 :

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

Figure 5 : Supply Current vs Temperature

CS05870
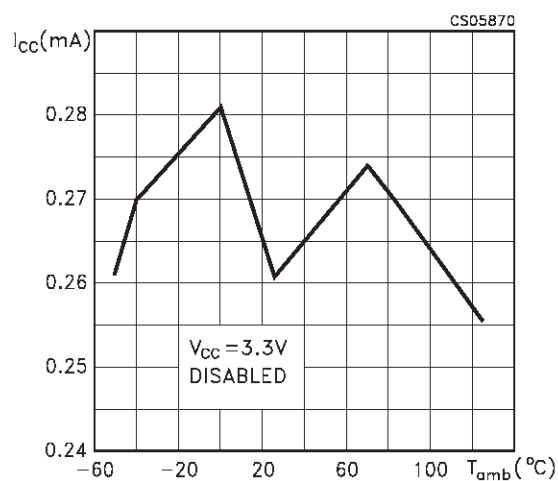
Figure 6 : Supply Current vs Temperature

CS05880
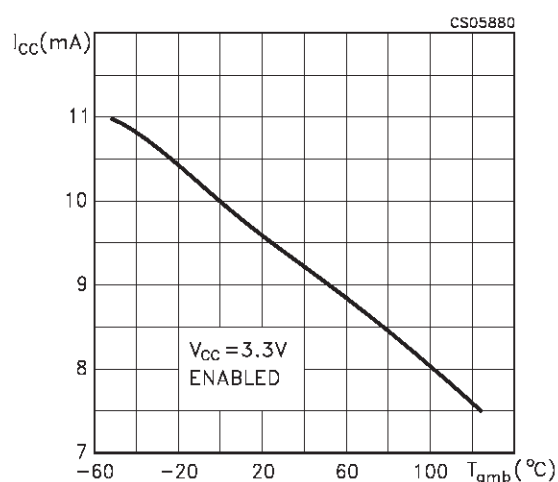
Figure 7 : Propagation Delay Enable to Output

CS05900
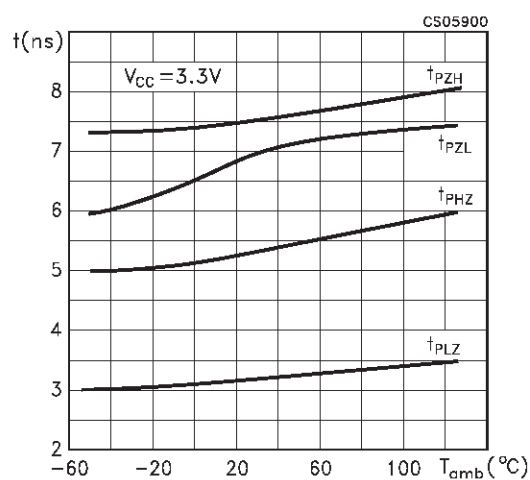
Figure 8 : Propagation Delay Time

CS05910
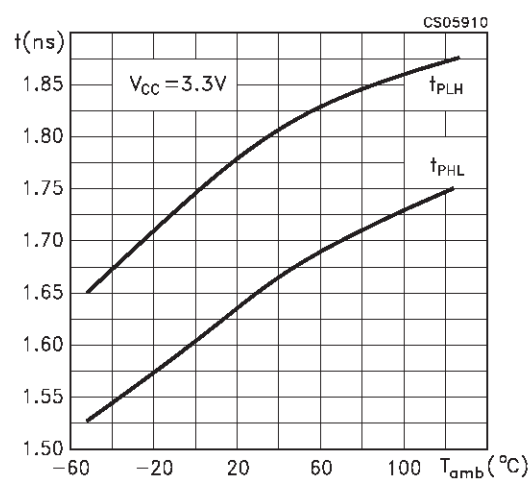
Figure 9 : Differential Outputt Signal

CS05890
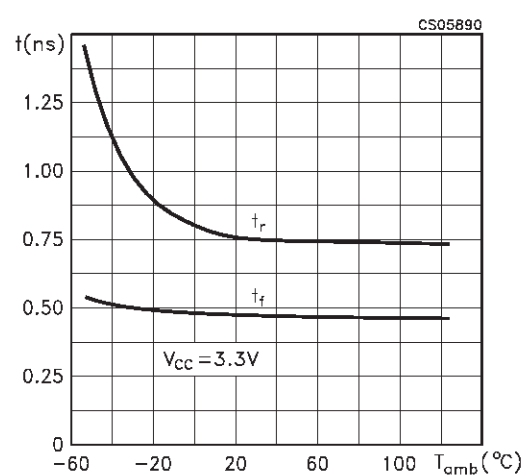
SO-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
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.)					
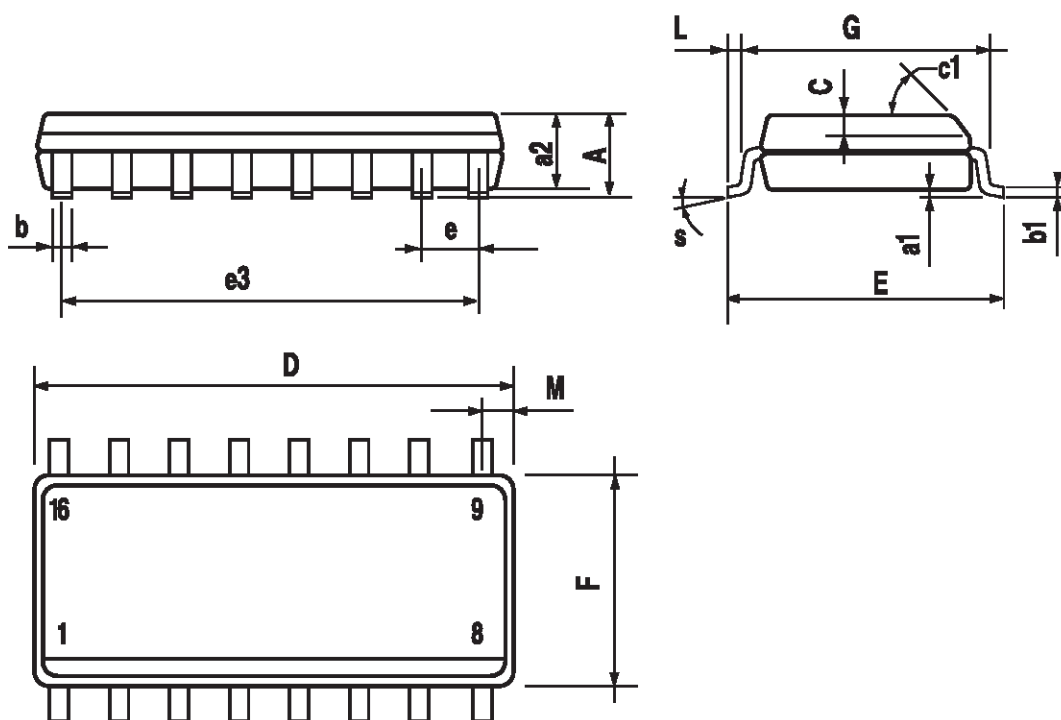
PO13H

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		0.0089
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

PIN 1 IDENTIFICATION

0080338D