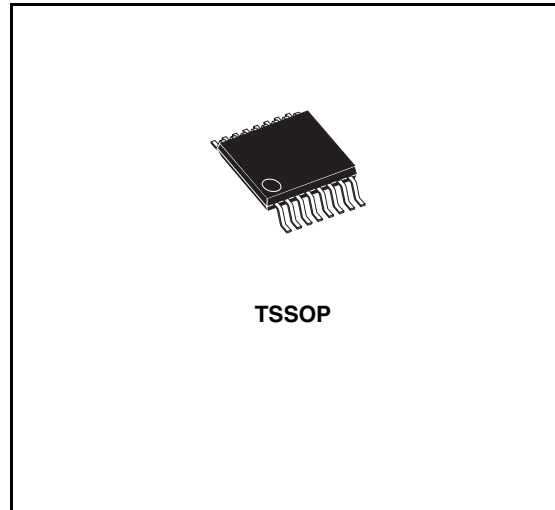# STLVDS32

High speed differential line receivers

Feature summary

- Meets or exceeds the requirements of ansi TIA/EIA-644 standard
- Operates with a single 3.3V supply
- Designed for signaling rate up to 400mbps
- Differential input thresholds ±100mV max
- Typical propagation delay time of 2.5ns
- Power dissipation 60mW typical per receiver at 200MHz
- Low voltage TTL (LVTTL) logic output levels
- Pin compatible with the AM26LS32, SN65LVD32
- Open circuit fail safe
- ESD protection:
- 7kV receiver pins
- 3kV all pins vs gnd

TSSOP

Description

The STLVDS32 is a differential line receiver 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 allow operations with a 3.3V supply rail. This differential receiver provides a valid logical output state with a 3.3V supply rail. It also provides a valid logical output state with a ±100mV differential input voltage within the input common mode voltage range. The input common mode voltage allows 1V of ground potential difference between two LVDS nodes.

The intended application of this device and signalling technique is both point-to-point and multidrop 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 depend upon the attenuation characteristics of the media and noise coupling to the environment.

The STLVDS32 version is characterized for operation from -55°C to 125°C.

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Order code

Part number	Temperature Range	Package	Packaging
STLVDS32BTR	-55 to 125 °C	TSSOP16 (Tape & Reel)	2500 parts per reel

Contents

1   Pin configuration

Figure 1.   Pin connections and functional diagram
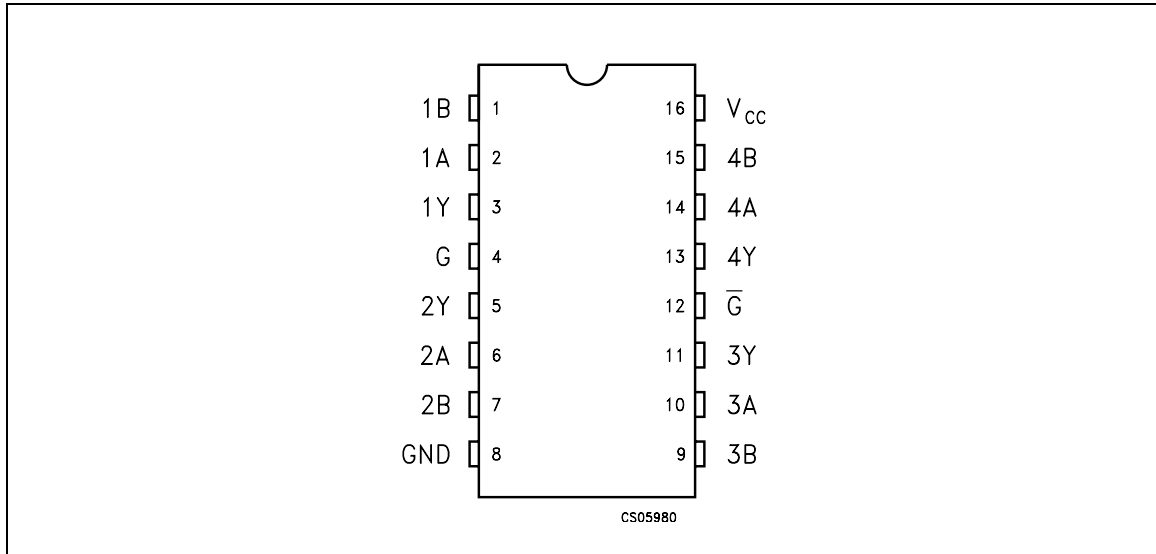
Table 1.   Pin description

Pin n°	Symbol	Name and function
2, 6, 10, 14	1A to 4A	Receiver Inputs
1, 7, 9, 15	1B to 4B	Negated Receiver Inputs
3, 5, 11, 13	1Y to 4Y	Receiver Outputs
4	G	Enable
12	$\overline{G}$	Enable
8	GND	Ground
16	V_{CC}	Supply Voltage

Figure 2.   Logic diagram and logic symbol
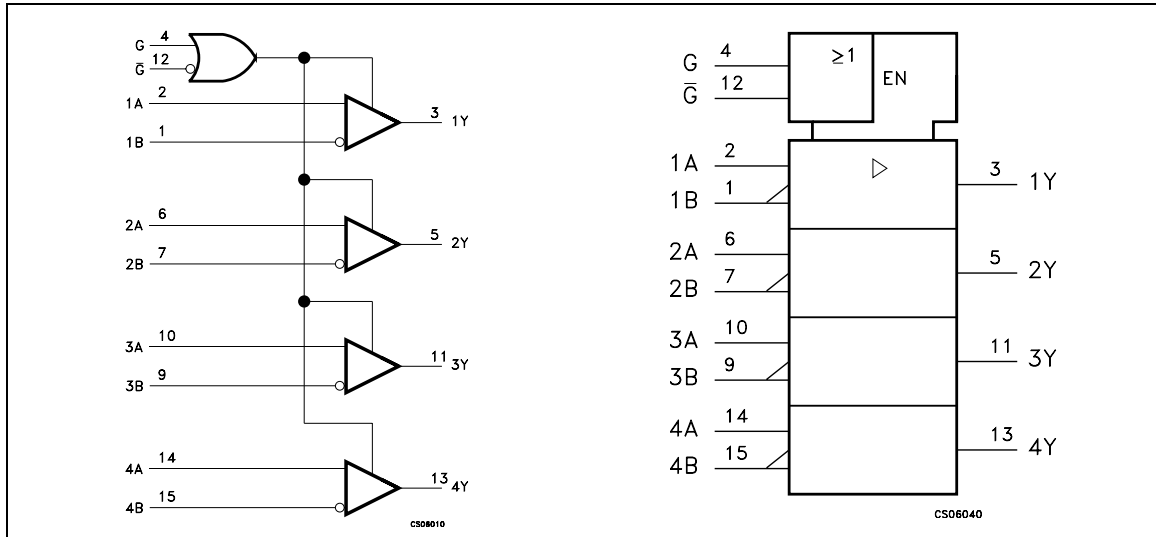
Table 2.   Truth table

Differential inputs	Enables		Outputs
A, B	**G**	**$\overline{G}$**	**Y**
$V_{ID} \geq 100mV$	H	X	H
	X	L	H
-100mV < V_{ID} < 100mV	H	X	?
	X	L	?
$V_{ID} \leq 100mV$	H	X	L
	X	L	L
X	L	H	Z
OPEN	H	X	H
	X	L	H

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

2 Maximum ratings

Table 3.   **Absolute maximum ratings**

Symbol	Parameter		Value	Unit
V_{CC}	Supply voltage [1]		-0.5 to 4.6	V
V_I	Input voltage		-0.5 to (V_{CC} + 0.5)	V
V_I	Input voltage (A or B inputs)		-0.5 to 4.6	V
ESD	Human body model	Pins receivers	7	kV
		All pins vs gnd	3	
T_{stg}	Storage temperature range		-65 to +150	°C

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

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

Table 4.   **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 (ENABLE)	2.0			V
V_{IL}	LOW Level Input Voltage (ENABLE)			0.8	V
$|V_{ID}|$	Magnitude of Differential Input Voltage	0.1		0.6	V
V_{IC}	Common Mode Input Voltage	$0.5|V_{ID}|$		$2.4-0.5|V_{ID}|$	V
				V_{CC} - 0.8	
T_A	Operating Temperature Range	-40		85	°C

3   Electrical characteristics

Table 5.   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	Min.	Typ.	Max.	Unit
V_{ITH+}	Positive Going Differential Input Voltage Threshold				100	mV
V_{ITH-}	Negative Going Differential Input Voltage Threshold		-100			mV
V_{OH}	High Level Output Voltage	I_{OH} = -8mA	2.4			V
		I_{OH} = -4mA	2.8			
V_{OL}	Low Level Output Voltage	I_{OH} = 8mA			0.4	V
I_{CC}	Supply Current	Enabled, No Load		10	18	mA
		Disabled		0.25	0.5	mA
I_I	Input Current (A or B inputs)	V_I = 0V	-2	-10	-20	µA
		V_I = 2.4V	-1.2	-3		
$I_{I(OFF)}$	Power off Input Current (A or B inputs)	V_{CC} = 0, V_I = 3.6V		10	20	µA
I_{CS}	Cold Spare Leakage Current	V_I = 3.6V, V_{DD} = 0V			±20	µA
I_{IH}	High Level Input Current (EN, G, $\overline{G}$ or Inputs)	V_{IH} = 2V			10	µA
I_{IL}	Low Level Input Current (EN, G, $\overline{G}$ or Inputs)	V_{IL} = 0.8V			10	µA
I_{OZ}	High Impedance Output Current	V_O = 0 or V_{CC}			±10	µA

Table 6.   Switching 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	Min.	Typ.	Max.	Unit
t_{PLH}	Propagation Delay Time, Low to High Output	C_L = 10p, Fig. 3	1.5	2.5	3.3	ns
t_{PHL}	Propagation Delay Time, High to Low Output		1.5	2.5	3.3	ns
t_r	Output Signal Rise Time			0.4		ns
t_f	Output Signal Fall Time			0.4		ns
$t_{sk(O)}$	Channel to Channel Output Skew (Note 1)			0.1	0.3	ns
$t_{sk(P)}$	Pulse Skew ($|t_{PHL} - t_{PLH}|$) (Note 2)			0.2	0.4	ns
$t_{sk(PP)}$	Part to Part Skew (Note 3)				1	ns
t_{PZH}	Propagation Delay Time, High Impedance to High Level Output	Fig. 4		3	12	ns
t_{PZL}	Propagation Delay Time, High Impedance to Low Level Output			5	12	ns
t_{PHZ}	Propagation Delay Time, High Level to High Impedance Output			5	12	ns
t_{PLZ}	Propagation Delay Time, Low Level to High Impedance Output			5	12	ns

Note 1: $t_{sk(O)}$ is the maximum delay time difference between the propagation delay of one channel and that of the others on the same chip with any event on the inputs.

Note 2: $t_{sk(P)}$ is the magnitude difference in differential propagation delay time between the positive going edge and the negative going edge of the same channel.

Note 3: $t_{sk(PP)}$ is the differential channel-to-channel skew of any event between devices. This specification applies to devices at the same VCC, and within 5°C of each other within the operating temperature range
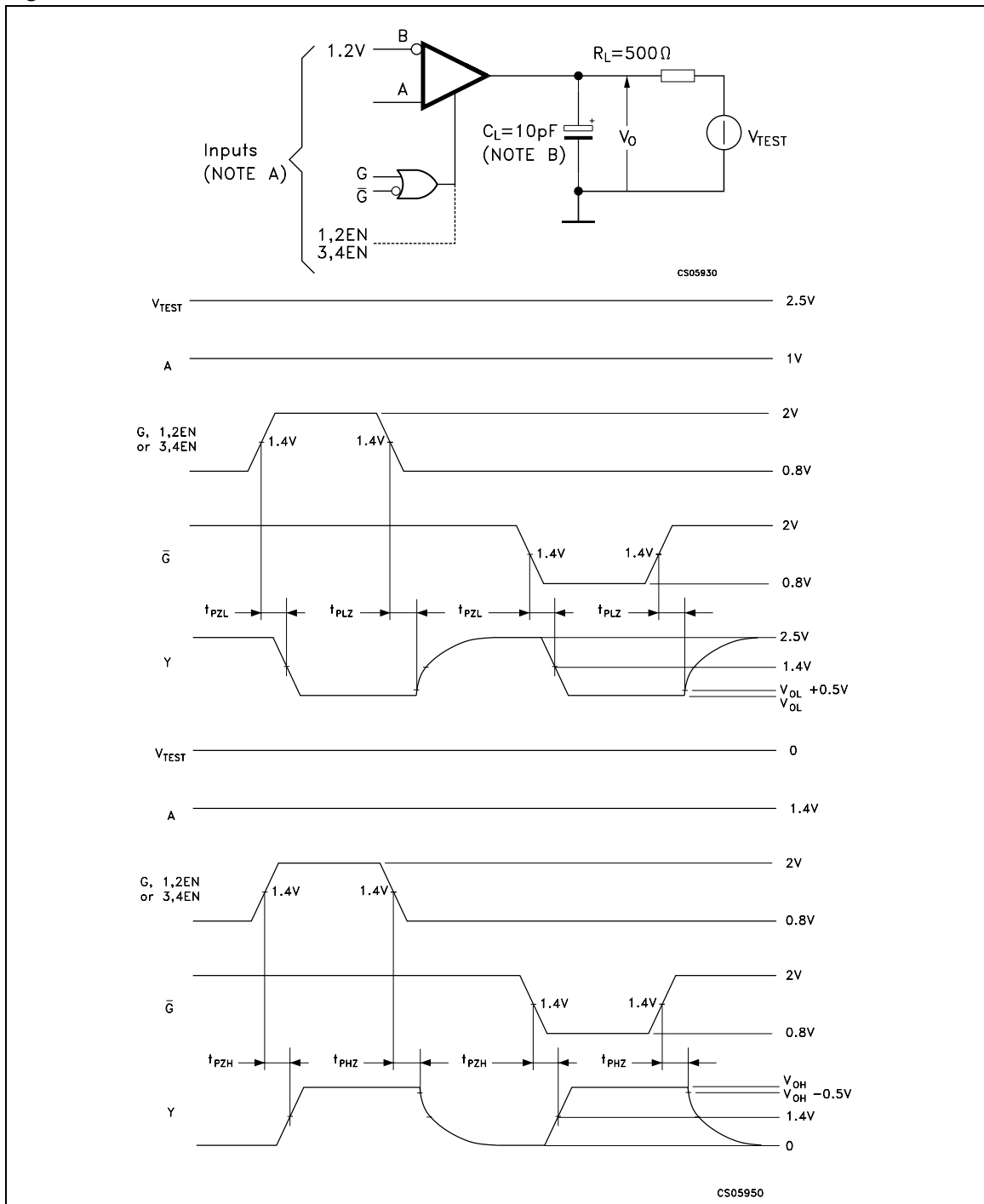
4   Typical characteristics

Figure 3.   Timing test and waveforms
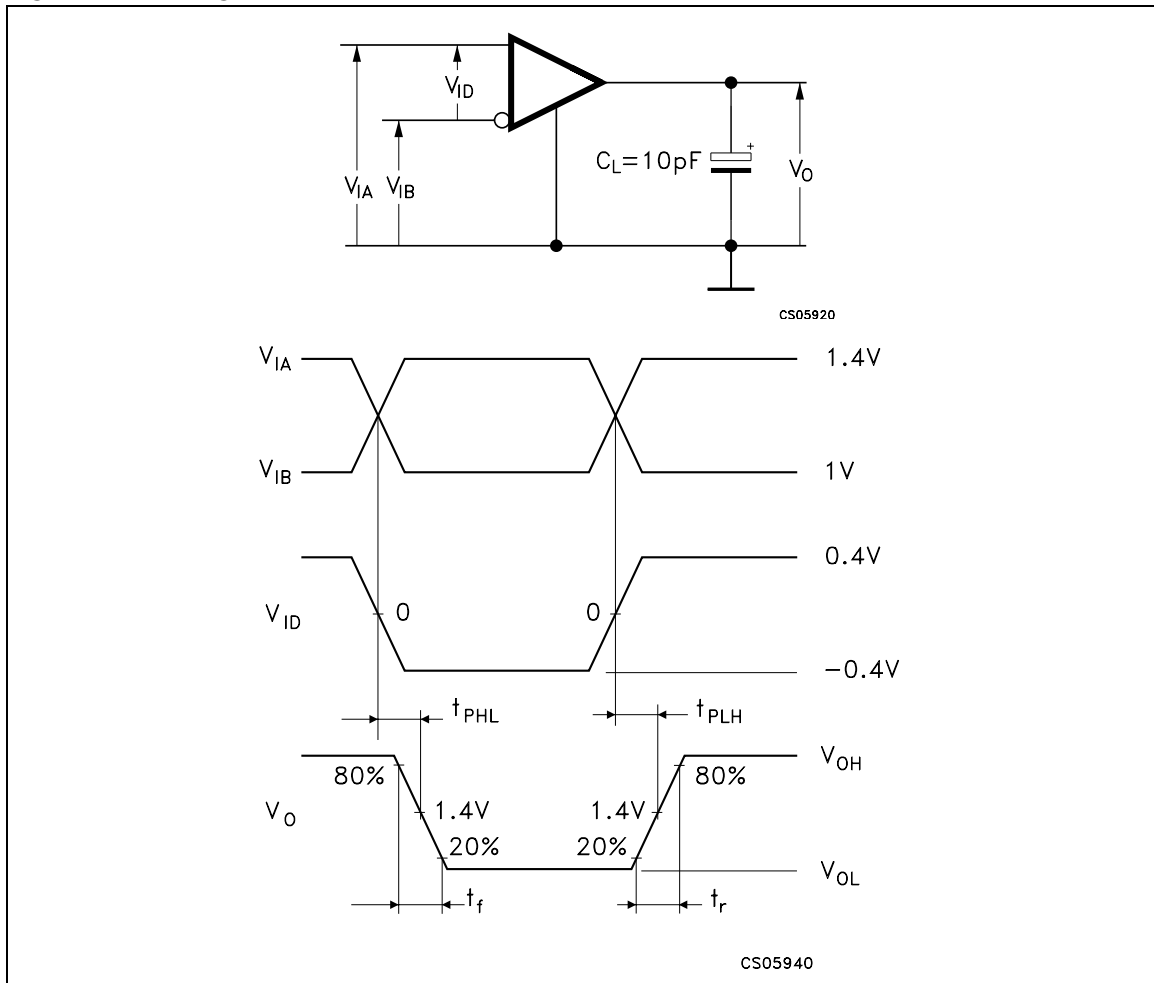
Note: A: All input pulse are supplied by a generator having the following characteristics:
t_r or $t_f \leq 1ns$, pulse repetition rate (PRR) = 50Mpps, pulse width = 10 ± 0.2ns.

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

Figure 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 $t_f \leq$
              1ns, 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.

5   Typical performance characteristics

(Unless otherwise specified $T_J = 25°C$)

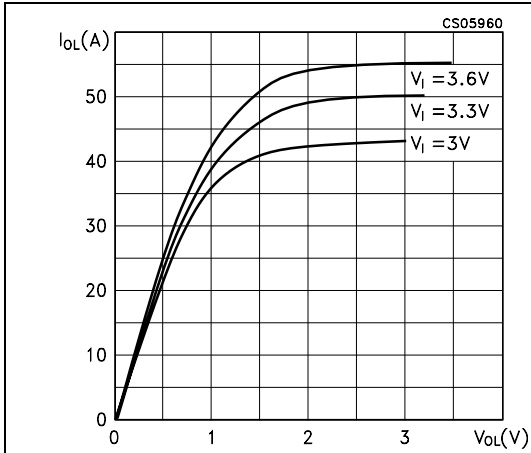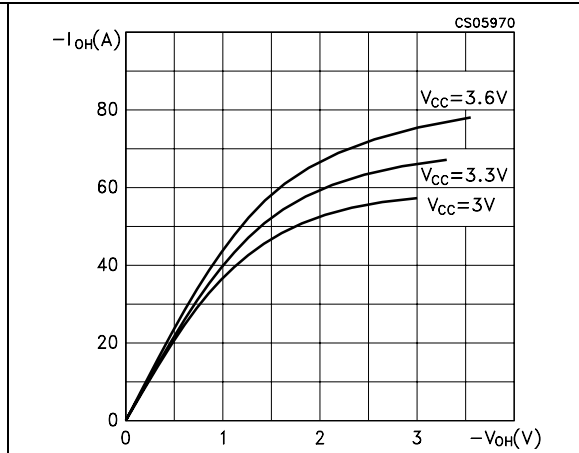**Figure 5.   Output current vs output voltage**   **Figure 6.   Output current vs output voltage**

6   Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK$^®$ packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

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

PIN 1 IDENTIFICATION

0080338D
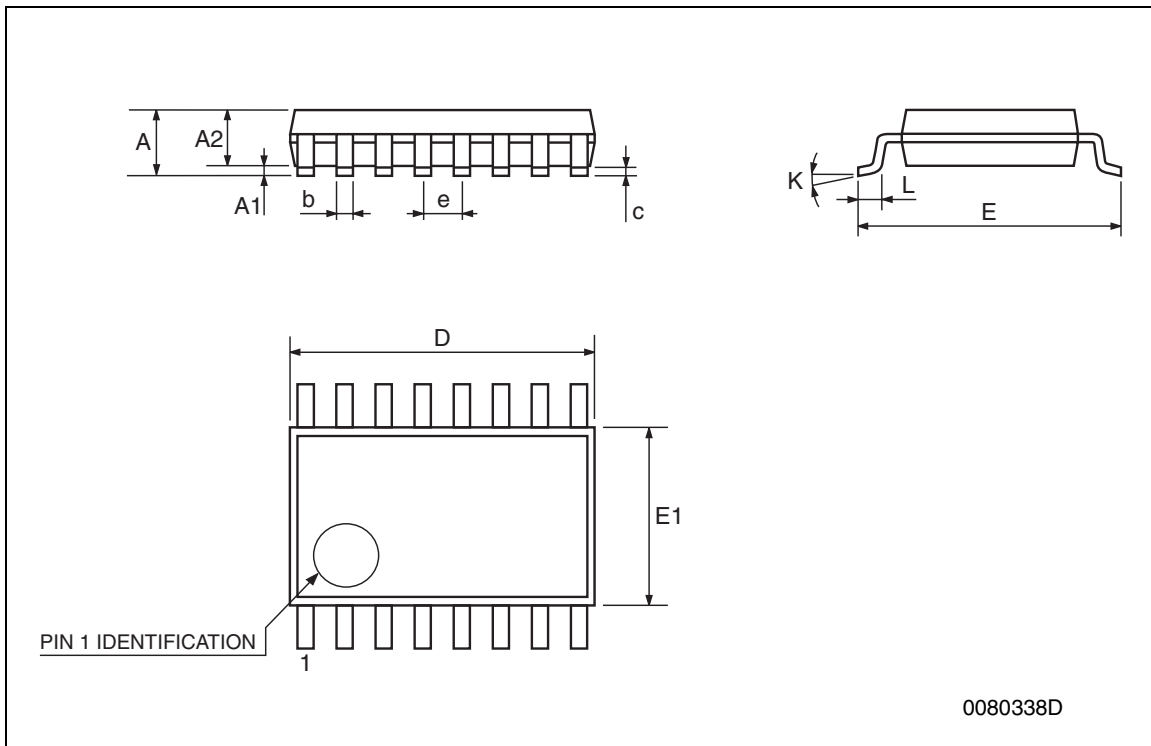
Tape & Reel TSSOP16 MECHANICAL DATA

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

Note: Drawing not in scale
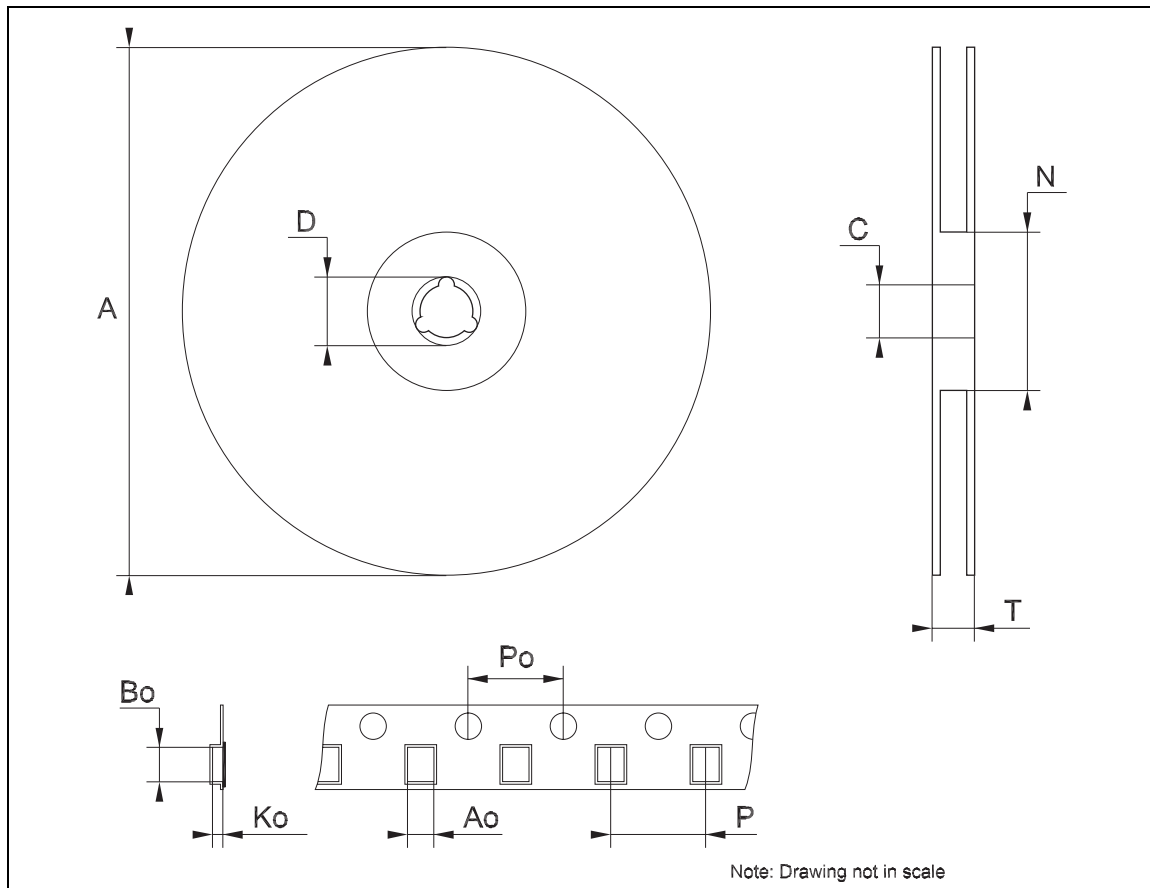
7   Revision history

Table 7.   Revision history

Date	Revision	Changes
07-Jul-2004	9	t_r and t_f description changed in table 6 - pag 7.
05-Dec-2005	10	Temperature Range has been changed in cover page, add I_{CS} on table 5.
28-Mar-2006	11	Order code has been updated and new template.
20-Mar-2007	12	Title in cover page has been updated.

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