TS372

Low power dual CMOS voltage comparator

Features

- Wide single supply range or dual supplies 3 V to 16 V or ±1.5 V to ±8 V
- Very low supply current: 0.1 mA/comparator independent of supply voltage
- Extremely low input bias current: 1 pA typ
- Extremely low input offset currents: 1 pA typ
- Low input offset voltage
- Input common-mode voltage range includes GND
- Low output saturation voltage 150 mV typical
- Output compatible with TTL, MOS and CMOS
- High input impedance: 10^{12} Ω typical
- Fast response time: 200 ns typ for TTL level input step

Applications

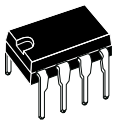
- Battery powered electronics
- General-purpose portable device
- General-purpose low voltage application

Description

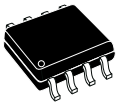
These devices consist of two independent precision voltage comparators, designed to operate with single or dual supplies.

These differential comparators use the STMicroelectronics silicon lin MOS process giving them an excellent consumption-speed ratio.

These devices are ideally suited for low consumption applications.

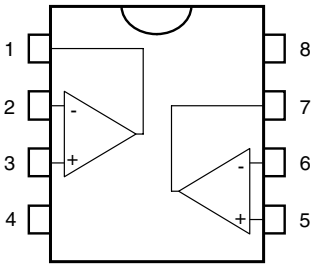


N
DIP8
(plastic package)



D
SO8
(plastic micropackage)

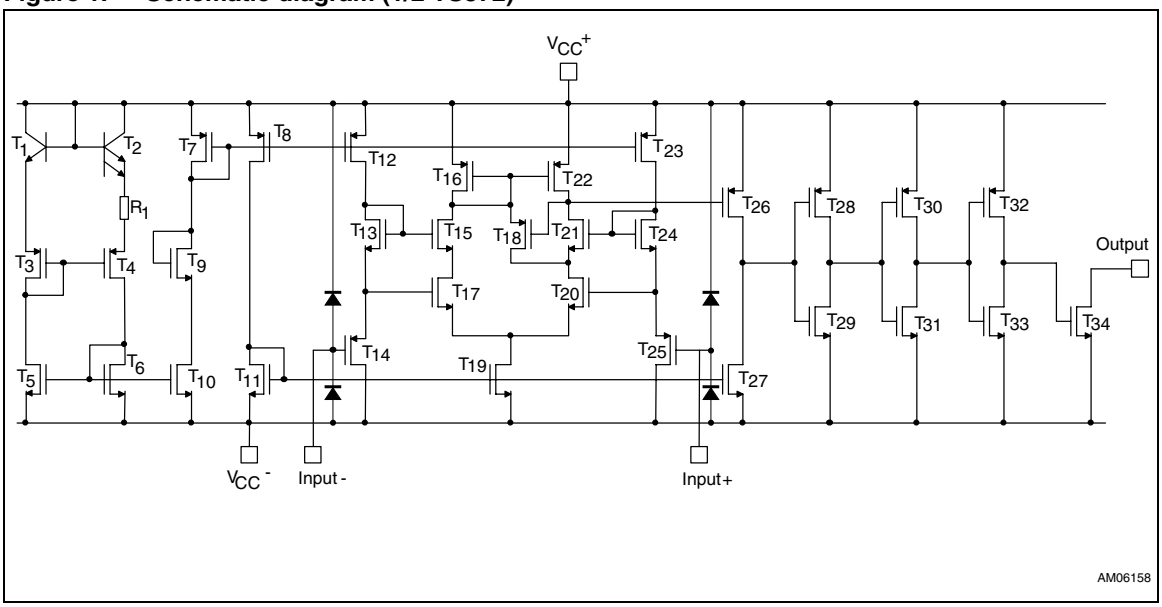
Pin connections (top view)



1 - Output 1
2 - Inverting Input 1
3 - Non-inverting Input 1
4 - V_{CC}^-
5 - Non-inverting Input 2
6 - Inverting Input 2
7 - Output 2
8 - V_{CC}^+

1 Application schematic

Figure 1. Schematic diagram (1/2 TS372)



2 Absolute maximum ratings and operating conditions

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}+	Supply voltage(1) (2)	18	V
V_{id}	Differential input voltage (3)	±18	V
V_i	Input voltage (4)	18	V
V_o	Output voltage	18	V
I_o	Output current	20	mA
I_F	Forward current in ESD protection diodes on input (5)	50	mA
	Duration of output circuit to GND (6)	Infinite	
p_d	Power dissipation (7) DIP8 SO8	 1250 710	mW
T_{stg}	Storage temperature range	-65 to +150	°C
T_j	Junction temperature	+150	°C

1. Maximum power supply voltage when the comparator is not switching.
2. All voltage values, except differential voltage, are with respect to network ground terminal.
3. Differential voltages are the non-inverting input terminal with respect to the inverting input terminal.
4. The magnitude of the input and the output voltages must never exceed the magnitude of the positive supply voltage.
5. Guaranteed by design.
6. Short-circuit from outputs to Vcc+ can cause excessive heating and eventual destruction.
7. Pd is calculated with T_{amb} = +25°C, T_j = +150°C and R_{thja} = 100°C/W for DIP8 package = 175°C/W for SO-8 package.

Table 2. Operating conditions

Symbol	Parameter	Value	Unit
V_{CC}+	Supply voltage	3 to 16	V
Vicm	Input common-mode voltage range(1) T_{amb} = 25°C $T_{min} \leq T_{amb} \leq T_{max}$ TS372C TS372I/TS372M	 V_{CC}^+ -2 V_{CC}^+ -2.25 V_{CC}^+ -2.5	V
T_{oper}	Operating free-air temperature range TS372C TS372I TS372M	 0 to +70 -40 to +125 -55 to +125	°C

1. And input voltages < = 12 V.

3 Electrical characteristics

Table 3. Electrical characteristics at V_{CC}+ = 5 V, V_{CC}- = 0 V, Tamb = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage (V_{ic} = $V_{icm\ min}$) (1) T_{amb} = 25°C $T_{min} \leq T_{amb} \leq T_{max}$		2	10 12	mV
I_{io}	Input offset current (2) T_{amb} = 25°C $T_{min} \leq T_{amb} \leq T_{max}$ TS372C TS372I/TS372M		1	100 200	pA
I_{ib}	Input offset current (2) T_{amb} = 25°C $T_{min} \leq T_{amb} \leq T_{max}$ TS372C TS372I/TS372M		1	150 300	pA
I_{OH}	High level output current (V_{id} = 1 V) T_{amb} = 25°C V_{OH} = 5 V $T_{min} \leq T_{amb} \leq T_{max}$ V_{OH} = 15 V		0.1	1	nA µA
V_{OL}	Low level output voltage (V_{id} = -1, I_{OL} = 4 mA) T_{amb} = 25°C $T_{min} \leq T_{amb} \leq T_{max}$		100	400 700	mV
I_{OL}	Low level output current (V_{id} = -1, V_{OL} = 1.5 V)	6	45		mA
I_{CC}	Supply current (each comparator) (V_{id} = 1 V, no load)		150	375	µA

1. The specified offset voltage is the maximum value required to drive the output down to 400 mV or up to 4 V with R_L = 100 kΩ to V_{cc}+
2. Maximum values including unavoidable inaccuracies of the industrial test.

Table 4. Switching characteristics (V_{CC}+ = 5 V, Tamb = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit
t_{re}	Response time (R_L = 5.1 kΩ connected to 5 V, C_L = 15 pF (1) 100mV input step with 5mV overdrive TTL level input step		600 200		ns

1. The specified response time is the internal between the input signal and the instant when the output signal crosses 1.4 V.

Note: If one of the two channels is not used, it must be configured with a differential input voltage greater than 100 mV to avoid switching.

4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

4.1 DIP8 package information

Figure 2. DIP8 package mechanical drawing

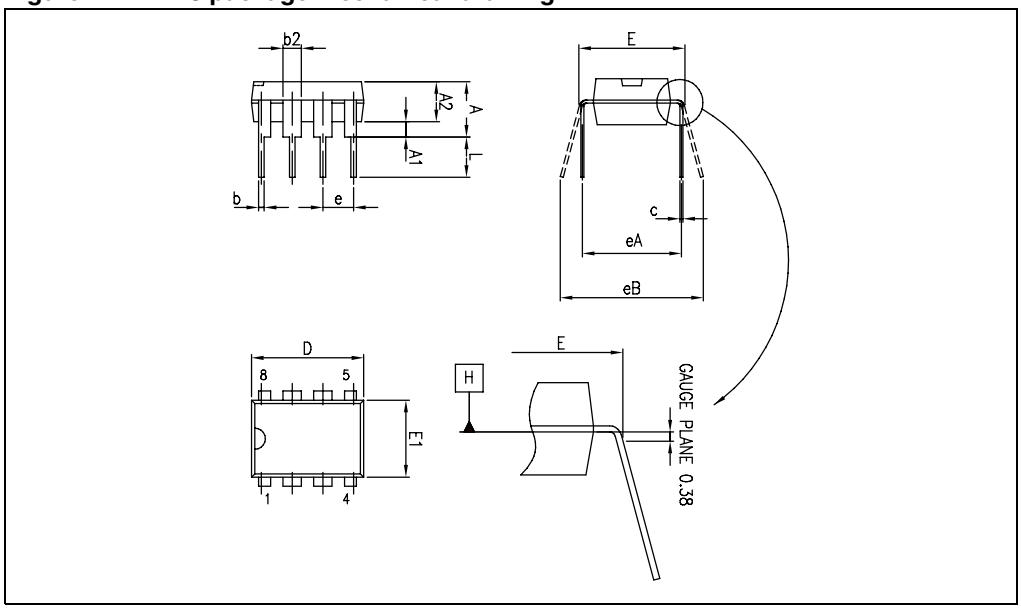


Table 5. DIP8 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5.33			0.210
A1	0.38			0.015		
A2	2.92	3.30	4.95	0.115	0.130	0.195
b	0.36	0.46	0.56	0.014	0.018	0.022
b2	1.14	1.52	1.78	0.045	0.060	0.070
c	0.20	0.25	0.36	0.008	0.010	0.014
D	9.02	9.27	10.16	0.355	0.365	0.400
E	7.62	7.87	8.26	0.300	0.310	0.325
E1	6.10	6.35	7.11	0.240	0.250	0.280
e		2.54			0.100	
eA		7.62			0.300	
eB			10.92			0.430
L	2.92	3.30	3.81	0.115	0.130	0.150

4.2 SO-8 package information

Figure 3. SO-8 package mechanical drawing

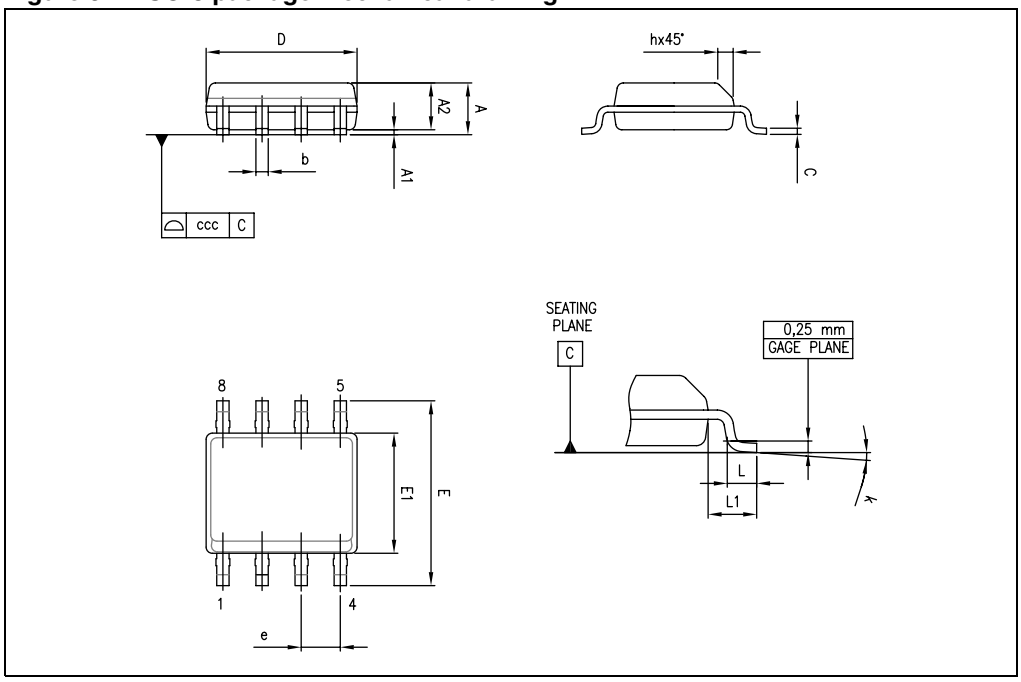


Table 6. SO-8 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
A1	0.10		0.25	0.004		0.010
A2	1.25			0.049		
b	0.28		0.48	0.011		0.019
c	0.17		0.23	0.007		0.010
D	4.80	4.90	5.00	0.189	0.193	0.197
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e		1.27			0.050	
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
L1		1.04			0.040	
k	0		8°	1°		8°
ccc			0.10			0.004

5 Ordering information

Table 7. Order codes

Part number	Temperature range	Package	Packing	Marking
TS372CD	0°C, +70°C	SO-8	Tube	
TS372CDT	0°C, +70°C	SO-8	Tape & reel	
TS372CN	0°C, +70°C	DIP8		
TS372ID	-40°C, +125°C	SO-8	Tube	
TS372IDT	-40°C, +125°C	SO-8	Tape & reel	
TS372IN	-40°C, +125°C	DIP8		

6 Revision history

Table 8. Document revision history

Date	Revision	Changes
01-Feb-2002	1	Initial release.
28-Apr-2011	2	Document reformatted. Modified *Table 2*, *Table 3* and *Table 7*.