钍地半导体
Tudi Semiconductor

Product Specification

TUDI-TS861/TS864

Rail-to-rail micropower BiCMOS comparators

网址 www.sztdbdt.com

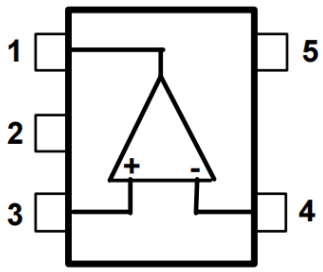
用芯智造·卓越品质

semiconductor device manufacturer

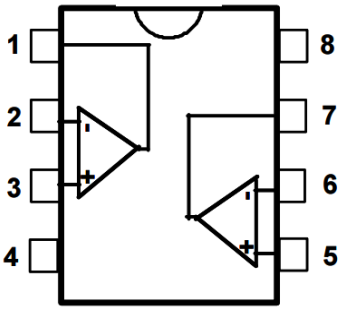
- Design
- research and development
- production
- and sales

Features

- Ultra low current consumption (6 μA/comp. at VCC = 2.7 V)
- Rail-to-rail CMOS inputs
- Push-pull outputs
- Supply operation from 2.7 to 10 V
- Low propagation delay
- ESD protection (2 kV)
- Latch-up immunity (class A)
- Available in SOT23-5 micropackage, SO-8, SO-14, TSSOP8, and TSSOP14 package



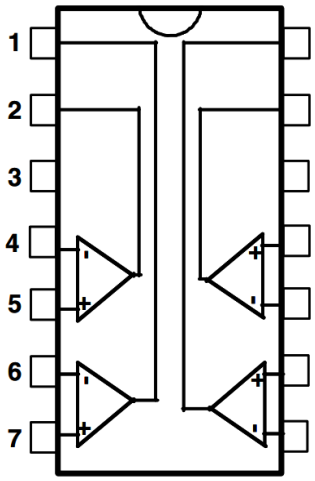
SOT23-5



SO-14, TSSOP14

Applications

- Battery powered systems such as alarms
- Portable communication systems
- Smoke/gas/fire detectors
- Portable computers



SO-14, TSSOP14

Description

The TS86x device (single, dual and quad) is a rail-to-rail comparator characterized for 2.7 to 10 V operation over -40 ° C to +85 ° C temperature ranges. It exhibits an excellent speed-to-power ratio, featuring a current consumption of 6 A per comparator and a response time of 500 ns at 2.7 V for a 100 mV overdrive.

Due to its ultra low power consumption and its availability in a tiny package, the TS86x comparator family is perfectly suited to battery-powered systems. The output stage is designed with a push-pull structure allowing a direct connection to the microcontroller without additional pull-up resistors.

1 Absolute maximum ratings and operating conditions

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage(1)	12	V
V_{ID}	Differential input voltage(2)	±12	V
V_{IN}	Input voltage range(3)	-0.3 to 12.3	V
R_{THJA}	Thermal resistance junction-to-ambient(4) SOT23-5 SO-8 SO-14 TSSOP8 TSSOP14	 250 125 105 120 100	°C/W
R_{THJC}	Thermal resistance junction-to-case(4) SOT23-5 SO-8 SO-14 TSSOP8 TSSOP14	 81 40 31 37 32	°C/W
T_{STG}	Storage temperature range	-65 to +150	°C
T_J	Maximum junction temperature	150	°C
T_{LEAD}	Lead temperature (soldering, 10 sec.)	260	°C
ESD	Human body model (HBM)(5) Machine model (MM)(6)	2 200	kV V
	Latch-up immunity	Class A	

1. All voltages values, except differential voltage are with respect to network terminal.
2. Differential voltages are non-inverting input terminal with respect to the inverting input terminal.
3. The magnitude of input and output voltages must never exceed V_{CC} +0.3 V.
4. Short-circuits can cause excessive heating. These values are typical.
5. Human body model: a 100 pF capacitor is charged to the specified voltage, then discharged through a 1.5 kΩ resistor between two pins of the device. This is done for all couples of connected pin combinations while the other pins are floating.
6. Machine model: a 200 pF capacitor is charged to the specified voltage, then discharged directly between two pins of the device with no external series resistor (internal resistor < 5 Ω). This is done for all couples of connected pin combinations while the other pins are floating.

Table 2. Operating conditions

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	2.7 to 10	V
V_{ICM}	Common mode input voltage range	V_{CC}^- - 0.3 to V_{CC}^+ + 0.3	V
T_{Oper}	Operating free air temperature range	-40 to + 85	°C

2 Electrical characteristics

Table 3. Electrical characteristics at V_{CC} = 2.7 V, T_{amb} = 25 °C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{IO}	Input offset voltage TS861/2/4 $T_{min} < T < T_{max}$ TS861/2/4A $T_{min} < T < T_{max}$		 3 3	 15 18 7 10	mV
ΔV_{IO}	Input offset voltage drift		6		µV/°C
I_{IO}	Input offset current(1) $T_{min} < T < T_{max}$		1	150 300	pA
I_{IB}	Input bias current(1) $T_{min} < T < T_{max}$		1	300 600	pA
V_{OH}	High level output voltage I_{SOURCE} = 2.5 mA $T_{min} < T < T_{max}$	 2.35 2.15	 2.45		V
V_{OL}	Low level output voltage I_{SINK} = 2.5 mA $T_{min} < T < T_{max}$		 0.2	 0.35 0.45	V
A_{VD}	Large signal voltage gain(2)		240		dB
CMR	Common mode rejection ratio $0 < V_{ICM} < 2.7$ V		 65		dB
SVR	Supply voltage rejection ratio $0 < V_{CC} < 10$ V		 80		dB
I_{CC}	Supply current per comparator No load, output low No load, output high		 6 8	 12 14	µA
T_{PLH}	Propagation delay from output low to output high V_{ICM} = 1.35 V, f = 10 kHz, C_L = 50 pF Overdrive = 10 mV Overdrive = 100 mV		 1.5 0.6		µs
T_{PHL}	Propagation delay from output high to output low V_{ICM} = 1.35 V, f = 10 kHz, C_L = 50 pF Overdrive = 10 mV Overdrive = 100 mV		 1.5 0.5		µs

Table 3. Electrical characteristics at V_{CC} = 2.7 V, T_{amb} = 25 °C (unless otherwise specified) (continued)

Symbol	Parameter	Min.	Typ.	Max.	Unit
T_F	Fall time f = 10 kHz, C_L = 50 pF, overdrive = 100 mV		20		ns
T_R	Rise time f = 10 kHz, C_L = 50 pF, overdrive = 100 mV		20		ns

1. Maximum values including unavoidable inaccuracies of the industrial tests.
2. Design evaluation.

Note: Limits are 100% production tested at 25 °C. Limits over temperature are guaranteed through correlation and by design.

Table 4. Electrical characteristics at V_{CC} = 5 V, T_{amb} = 25 °C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{IO}	Input offset voltage TS861/2/4 $T_{min} < T < T_{max}$ TS861/2/4A $T_{min} < T < T_{max}$		3 3	15 18 7 10	mV
ΔV_{IO}	Input offset voltage drift		6		µV/°C
I_{IO}	Input offset current(1) $T_{min} < T < T_{max}$		1	150 300	pA
I_{IB}	Input bias current(1) $T_{min} < T < T_{max}$		1	300 600	pA
V_{OH}	High level output voltage I_{SOURCE} = 5 mA $T_{min} < T < T_{max}$	4.6 4.45	4.8		V
V_{OL}	Low level output voltage I_{SINK} = 5 mA $T_{min} < T < T_{max}$		0.2	0.4 0.55	V
A_{VD}	Large signal voltage gain(2)		240		dB
CMR	Common mode rejection ratio $0 < V_{ICM} < 5$ V		70		dB
SVR	Supply voltage rejection ratio $2.7 < V_{CC} < 10$ V		80		dB
I_{CC}	Supply current per comparator No load, output low No load, output high		6 8	12 14	µA
T_{PLH}	Propagation delay from output low to output high V_{ICM} = 2.5 V, f = 10 kHz, C_L = 50 pF Overdrive = 10 mV Overdrive = 100 mV		2 0.5		µs
T_{PHL}	Propagation delay from output high to output low V_{ICM} = 2.5 V, f = 10 kHz, C_L = 50 pF Overdrive = 10 mV Overdrive = 100 mV		2 0.4		µs
T_F	Fall time f = 10 kHz, C_L = 50 pF, overdrive = 100 mV		20		ns
T_R	Rise time f = 10 kHz, C_L = 50 pF, overdrive = 100 mV		20		ns

1. Maximum values including unavoidable inaccuracies of the industrial test.
2. Design evaluation.

Note: Limits are 100% production tested at 25 °C. Limits over temperature are guaranteed through correlation and by design.

Table 5. Electrical characteristics at V_{CC} = +10 V, T_{amb} = 25 °C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{IO}	Input offset voltage (V_{ICM} = V_{CC} / 2) TS861/2/4 T_{min} < T < T_{max}		3	15 18	mV
ΔV_{IO}	Input offset voltage drift		6		µV/°C
I_{IO}	Input offset current(1) T_{min} < T < T_{max}		1	150 300	pA
I_{IB}	Input bias current(1) T_{min} < T < T_{max}		1	300 600	pA
V_{OH}	High level output voltage I_{SOURCE} = 5 mA T_{min} < T < T_{max}	9.6 9.45	9.8		V
V_{OL}	Low level output voltage I_{SINK} = 5 mA T_{min} < T < T_{max}		0.2	0.4 0.55	V
A_{VD}	Large signal voltage gain(2)		240		dB
CMR	Common mode rejection ratio 0 < V_{ICM} < 10 V		75		dB
SVR	Supply voltage rejection ratio 2.7 < V_{CC} < 10 V		80		dB
I_{CC}	Supply current per comparator No load, output low No load, output high		7 10	14 16	µA
T_{PLH}	Propagation delay from output low to output high V_{ICM} = 5 V, f = 10 kHz, C_L = 50 pF Overdrive = 10 mV Overdrive = 100 mV		3 0.5		µs
T_{PHL}	Propagation delay from output high to output low V_{ICM} = 5 V, f = 10 kHz, C_L = 50 pF Overdrive = 10 mV Overdrive = 100 mV		2.6 0.4		µs
T_F	Fall time f = 10 kHz, C_L = 50 pF, overdrive = 100 mV		20		ns
T_R	Rise time f = 10 kHz, C_L = 50 pF, overdrive = 100 mV		20		ns

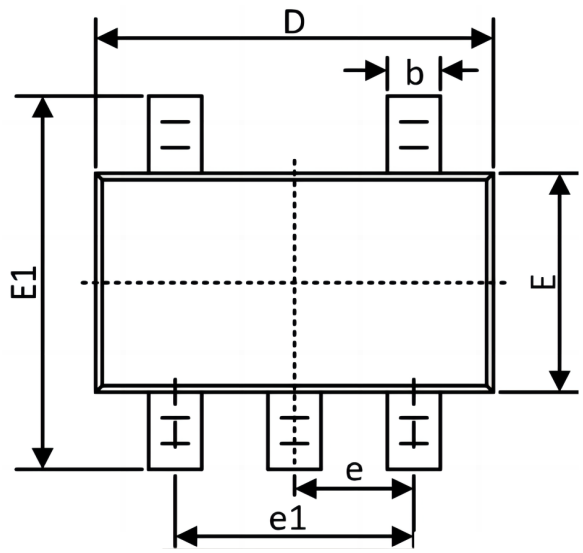
1. Maximum values including unavoidable inaccuracies of the industrial test.
2. Design evaluation.

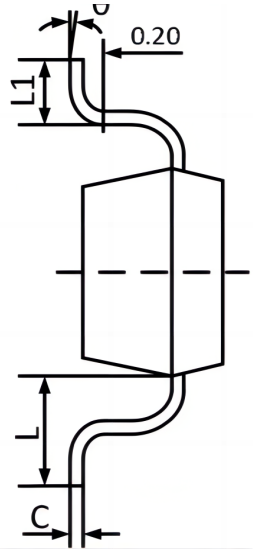
Note: Limits are 100% production tested at 25 °C. Limits over temperature are guaranteed through correlation and by design.

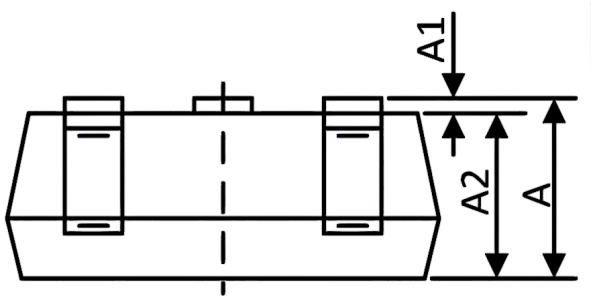
Order information

Order Number	Package	Package Quantity	Marking On The park
TS861AILT-TUDI	SOT23	Tape,Reel,3000	TS861AILT
TS861ILT-TUDI	SOT23	Tape,Reel,3000	TS861ILT
TS864IDT-TUDI	SOP14	Tape,Reel,2500	TS864IDT

Package SOT23-5

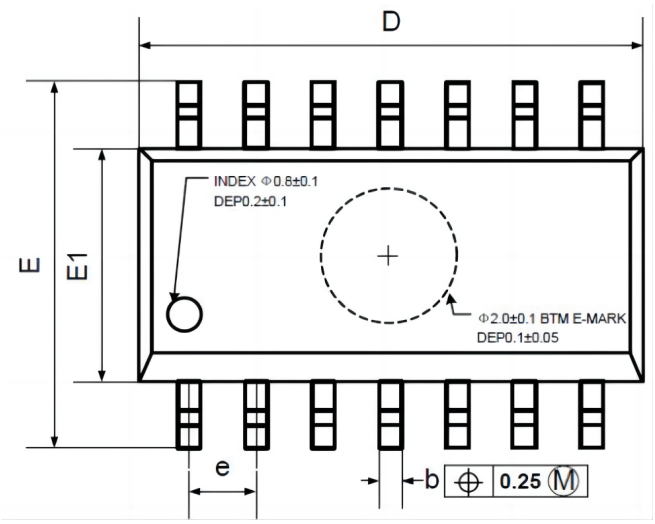


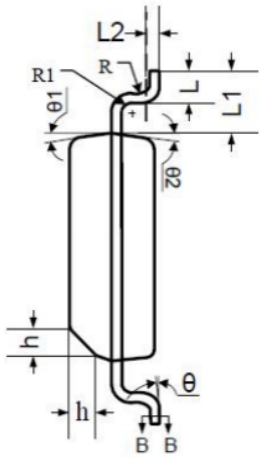


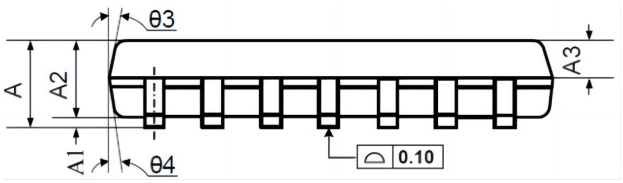


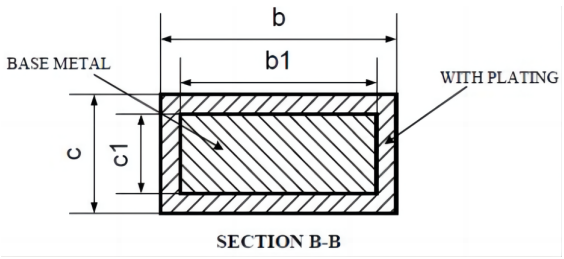
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
C	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Package SOP14









Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.36		0.49
b1	0.35	0.40	0.45
C	0.16		0.25
c1	0.15	0.20	0.25
D	8.53	8.63	8.73
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
R	0.07		
R1	0.07		
h	0.30	0.40	0.50
θ	0°		8°
θ1	6°	8°	10°
θ2	6°	8°	10°
θ3	5°	7°	9°
θ4	5°	7°	9°

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