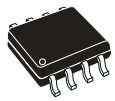
TSL393, TSL339

Datasheet

Micropower, rail-to-rail, 5 V cost-effective comparators

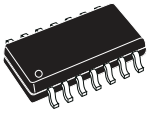
TSL393



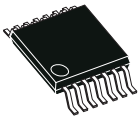
SO-8

DFN8 2x2
wettable flanks

TSL339



SO14



TSSOP14

Maturity status link
TSL393, TSL339

Related products	
TSL331, TSL332, TSL334	For higher performance

Features

- Supply operation from 1.65 V to 5 V
- Low supply current consumption: 25 µA
- Rail-to-rail inputs
- Wide temperature range: -40 to 125 °C
- Low output saturation voltage
- Propagation delay: 400 ns
- Open-drain output
- ESD tolerance: 2 kV HBM
- Automotive qualified

Applications

- Cost-sensitive applications
- Industrial
- Automotive
- Battery-powered products

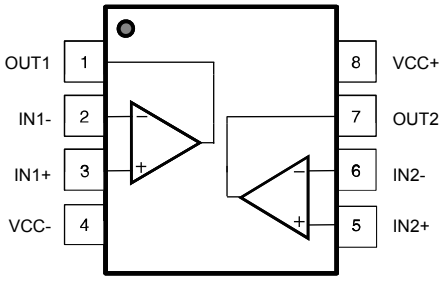
Description

The TSL393 and TSL339 are dual and quad micropower and low-voltage comparators. They can operate with a supply voltage ranging from 1.65 V to 5 V with a typical current consumption as low as 25 µA. These devices are a perfect choice for low-voltage applications.

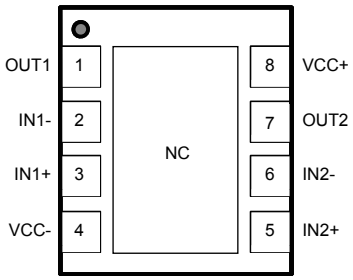
The TSL393 and TSL339 are specified for temperatures between -40 °C to +125 °C, making them ideal for a wide range of applications.

1 Pin connections

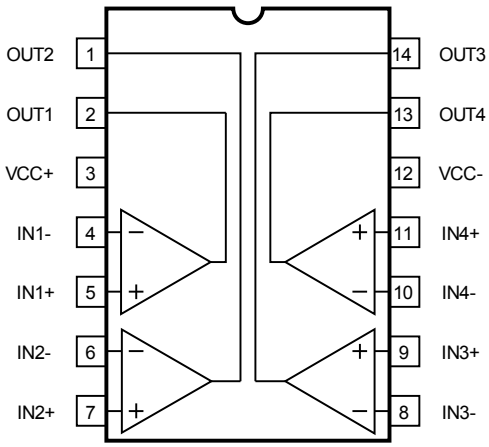
Figure 1. **TSL393, TSL339 pin connections (top view)**



TSL393
SO-8



TSL393
DFN8 2x2 wettable flanks



TSL339
SO14/TSSOP14

2 Absolute maximum ratings and operation conditions

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage (1)	5.5	V
V_{ID}	Differential input voltage (2)	+/- 5.5	
V_{in}	Input voltage range (3)	(Vcc-) -0.3 to (Vcc+) +0.3	
V_{out}	Output voltage	5.5	
T_{stg}	Storage temperature	-65 to 150	°C
T_j	Junction temperature	150	°C
$R_{th\text{-}ja}$	Thermal resistance junction to ambient (4) (5) SO-8 DFN8 2x2 wettable flank SO-14 TSSOP-14	 125 57 105 100	°C/W
ESD	Human Body Model (HBM) (6)	2000	V
	Charged Device Model (CDM) (7)	1500	

1. *All voltage values, except differential voltage, are with respect to Vcc-.*
2. *The differential voltage is the non-inverting input terminal with respect to the inverting input terminal*
3. *Input current must be limited by a resistor in series with the inputs.*
4. *R_{th} are typical values.*
5. *Short-circuits can cause excessive heating and destructive dissipation.*
6. *According to JEDEC standard JESD22-A114F.*
7. *According to ANSI/ESD STM5.3.1.*

Table 2. Operating conditions

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	1.65 to 5.0	V
T	Operating free-air temperature range	-40 to 125	°C

3 Electrical characteristics

V_{CC} = 1.8 V to 5 V, V_{icm} = V_{CC} / 2, T = 25 °C (unless otherwise specified).
Production screening at V_{CC} = 5 V, operation on the full supply range ensured by design and characterization.

Table 3. Electrical characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
DC performance						
V_{IO}	Input offset voltage			0.5	6	mV
$\lvert\Delta V_{IO}/\Delta T\rvert$	Input offset voltage drift	Tmin < T < Tmax		5		µV/°C
$\lvert I_{IB}\rvert$	Input bias current			25		nA
$\lvert I_{IO}\rvert$	Input offset current			1		
I_{CC}	Supply current	No load, output low		25	37	µA
I_{OH}	Output leakage current	V_{OUT} = V_{CC}		1		nA
V_{OL}	Low-level output voltage	I_{sink} = 1 mA		50	100	mV
I_{sink}	Output sink current	V_{CC} = 5 V	60	93		mA
CMRR	Common mode rejection ratio	V_{CC} = 5 V, Tmin < T < Tmax V_{CC} = 1.8 V, Tmin < T < Tmax	58 50	65 60		dB
SVR	Supply voltage rejection			75		
t_{PHL}	Propagation delay (high to low)	V_{ICM} = 0 V, R_{PU} = 5.1 kΩ, C_L = 50 pF, overdrive = 10 mV		400		ns
t_{PLH}	Propagation delay (low to high)	V_{ICM} = 0 V, R_{PU} = 5.1 kΩ, C_L = 50 pF, overdrive = 10 mV		550		

4 Package information

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 DFN8 2x2 mm package information

Figure 2. **DFN8 2x2 mm wettable flanks package outline**

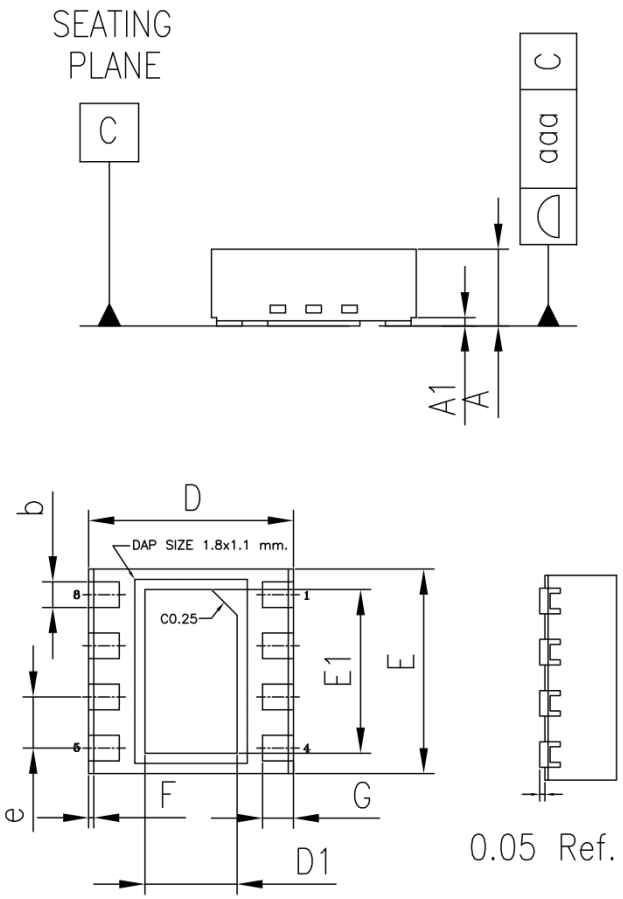


Table 4. **DFN8 2x2 mm wettable flanks package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.70	0.75	0.80	0.027	0.029	0.031
A1		0.10			0.003	
b	0.20	0.25	0.30	0.007	0.009	0.011
D	1.95	2.00	2.05	0.076	0.078	0.080
D1	0.80	0.90	1.00	0.031	0.035	0.039
E	1.95	2.00	2.05	0.076	0.078	0.080
E1	1.50	1.60	1.70	0.059	0.062	0.066
e		0.50			0.019	
F		0.05			0.001	
G	0.25	0.30	0.35	0.009	0.011	0.013
aaa		0.10			0.003	

4.2 SO8 package information

Figure 3. **SO8 package outline**

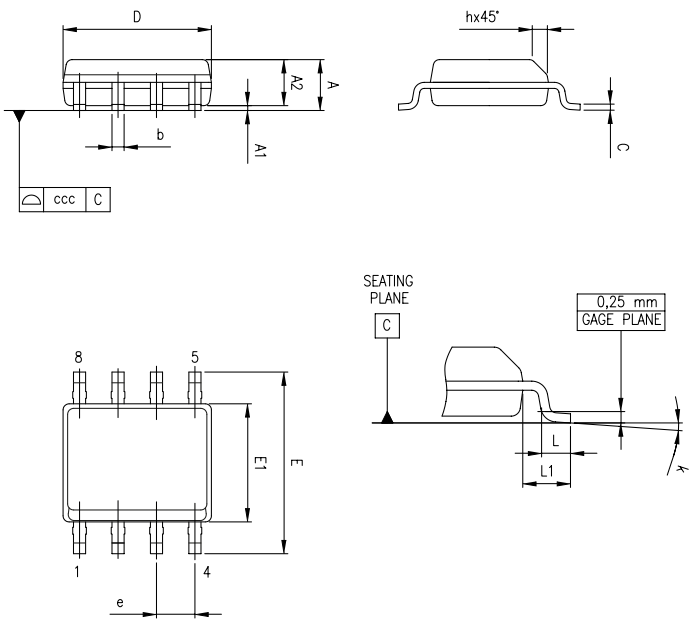


Table 5. **SO8 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
A1	0.10		0.25	0.04		0.010
A2	1.25			0.049		
b	0.28	0.40	0.48	0.011	0.016	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	0.635	1.27	0.016		0.050
L1		1.04			0.040	
k	1°		8°	1°		8°
ccc			0.10			0.004

4.3 SO14 package information

Figure 4. **SO14 package outline**

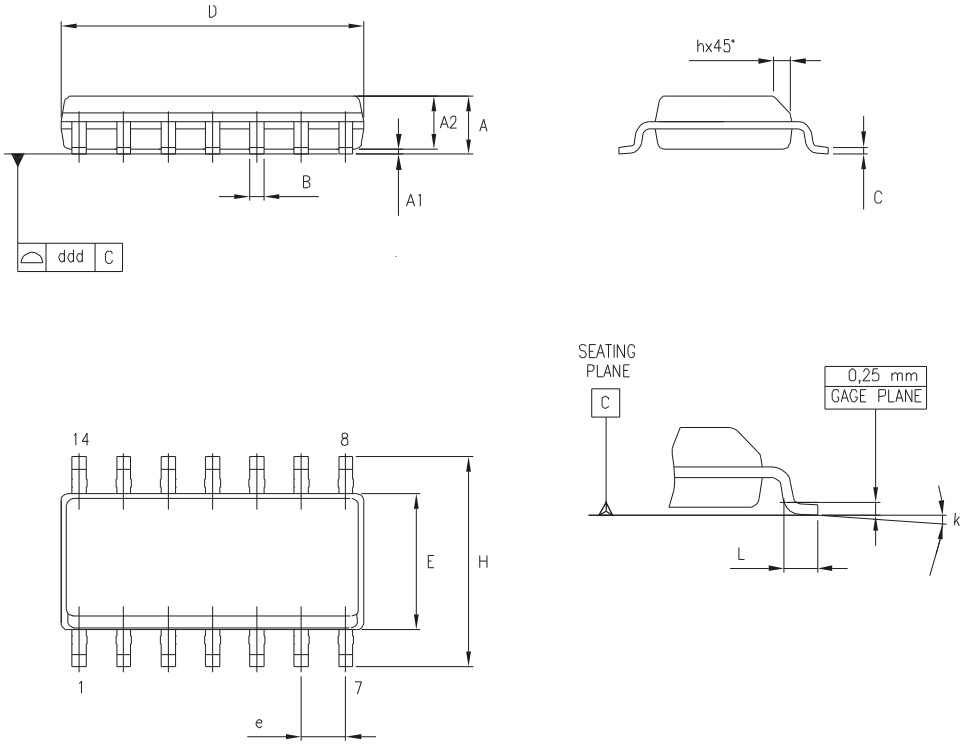


Table 6. **SO14 mechanical data**

Dimensions [1]						
Symbol	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.75	0.05		0.068
A1	0.10		0.25	0.004		0.009
A2	1.10		1.65	0.04		0.06
B	0.33		0.51	0.01		0.02
C	0.19		0.25	0.007		0.009
D [2]	8.55		8.75	0.33		0.34
E	3.80		4.0	0.15		0.15
e		1.27			0.05	
H	5.80		6.20	0.22		0.24
L	0.40		1.27	0.015		0.05
k	0°		8°	0°		8°
ddd			0.10			0.004

1. *Drawing dimensions include “Single” and “Matrix” versions.*
2. *Dimension “D” does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.*

4.4 TSSOP14 package information

Figure 5. **TSSOP14 package outline**

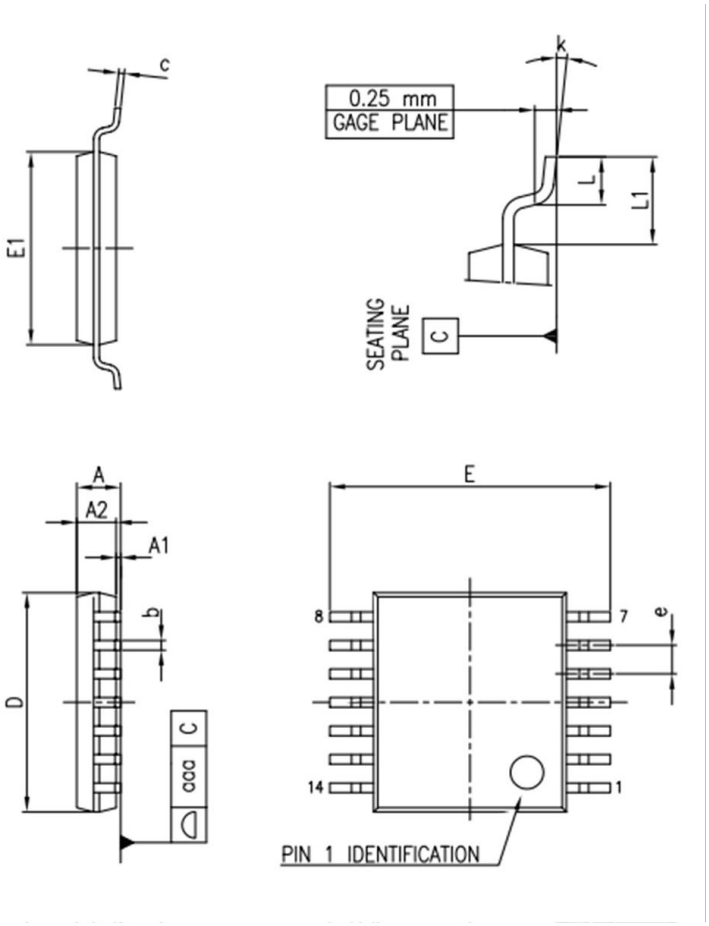


Table 7. **TSSOP14 mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A			1.20
A1	0.05		0.15
A2	0.80	1.00	1.05
b	0.19		0.30
c	0.09		0.20
D	4.90	5.00	5.10
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e		0.65 BSC	
L	0.45	0.60	0.75
L1		1.00	
k	0		8
aaa			0.10

5 Ordering information

Table 8. Order codes

Order code	Temperature range	Package	Packaging	Marking
TSL393IDT	-40 °C to +125 °C	SO8	Tape and reel	TSL393I
TSL393IYDT (1)				TSL393IY
TSL393IQ2T		DFN8 2x2 wettable flanks		K60
TSL393IYQ3T (1)				K53
TSL339IDT		SO14		TSL339I
TSL339IYDT (1)				TSL339IY
TSL339IPT		TSSOP14		TSL339I
TSL339IYPT (1)				TSL339IY

1. *Qualified and characterized according to AEC Q100 and Q003 or equivalent, advanced screening according to AEC Q001 & Q002 or equivalent.*

Revision history

Table 9. **Document revision history**

Date	Revision	Changes
06-Nov-2024	1	Initial release.

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