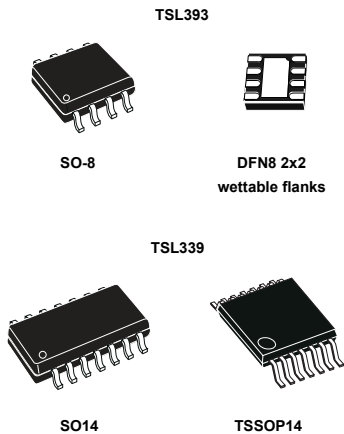


Micropower, rail-to-rail, 5 V cost-effective comparators



Features

- Supply operation from 1.65 V to 5 V
- Low supply current consumption: 25 μ A
- 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 μ A. 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.

Maturity status link

[TSL393, TSL339](#)

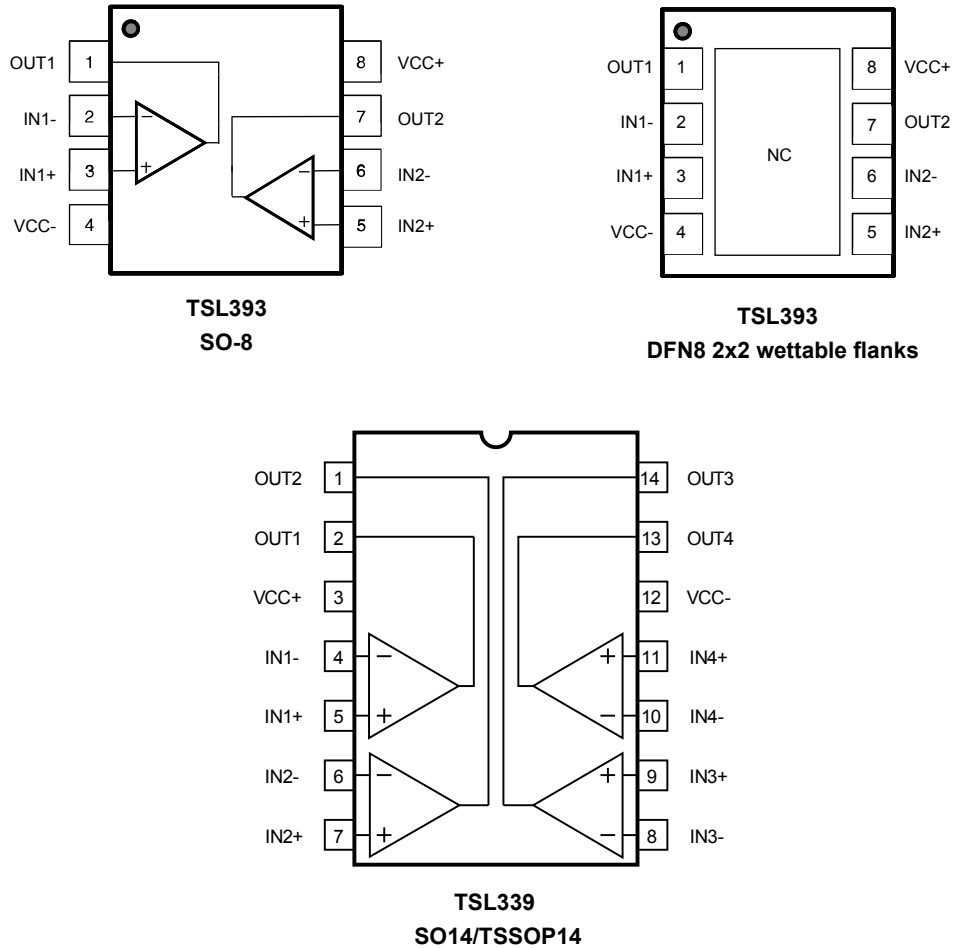
Related products

[TSL331](#),
[TSL332](#),
[TSL334](#)

For higher performance

1 Pin connections

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



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⁾	(V _{CC-}) -0.3 to (V _{CC+}) +0.3	
V _{out}	Output voltage	5.5	
T _{stg}	Storage temperature	-65 to 150	°C
T _j	Junction temperature	150	°C
R _{th-ja}	Thermal resistance junction to ambient ^{(4) (5)}		°C/W
	SO-8	125	
	DFN8 2x2 wettable flank	57	
	SO-14	105	
ESD	TSSOP-14	100	V
	Human Body Model (HBM) ⁽⁶⁾	2000	
	Charged Device Model (CDM) ⁽⁷⁾	1500	

1. All voltage values, except differential voltage, are with respect to V_{CC-}.
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

$V_{CC} = 1.8\text{ V to }5\text{ V}$, $V_{icm} = V_{CC} / 2$, $T = 25\text{ }^{\circ}\text{C}$ (unless otherwise specified).

Production screening at $V_{CC} = 5\text{ V}$, 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
$ \Delta V_{IO}/\Delta T $	Input offset voltage drift	$T_{min} < T < T_{max}$		5		$\mu\text{V}/^{\circ}\text{C}$
$ I_{IB} $	Input bias current			25		nA
$ I_{IO} $	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	$I_{sink} = 1\text{ mA}$		50	100	mV
I_{sink}	Output sink current	$V_{CC} = 5\text{ V}$	60	93		mA
CMRR	Common mode rejection ratio	$V_{CC} = 5\text{ V}$, $T_{min} < T < T_{max}$	58	65		dB
		$V_{CC} = 1.8\text{ V}$, $T_{min} < T < T_{max}$	50	60		
SVR	Supply voltage rejection			75		
t_{PHL}	Propagation delay (high to low)	$V_{ICM} = 0\text{ V}$, $R_{PU} = 5.1\text{ k}\Omega$, $C_L = 50\text{ pF}$, overdrive = 10 mV		400		ns
t_{PLH}	Propagation delay (low to high)	$V_{ICM} = 0\text{ V}$, $R_{PU} = 5.1\text{ k}\Omega$, $C_L = 50\text{ pF}$, 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

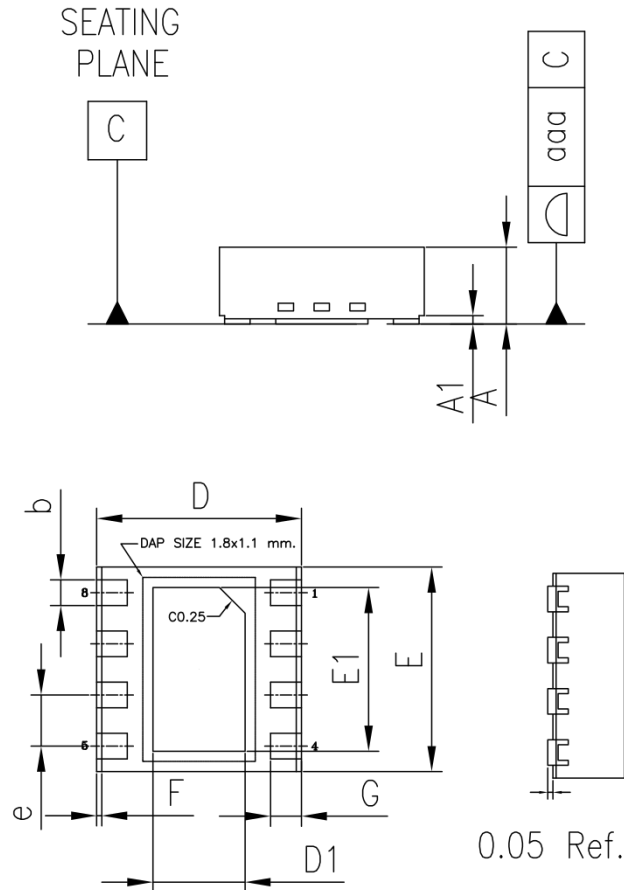


Table 4. DFN8 2x2 mm wettable flanks package mechanical data

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

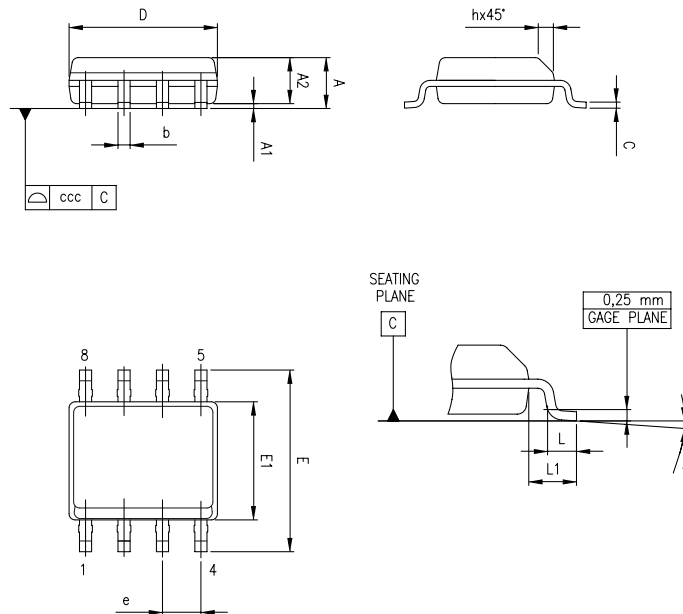
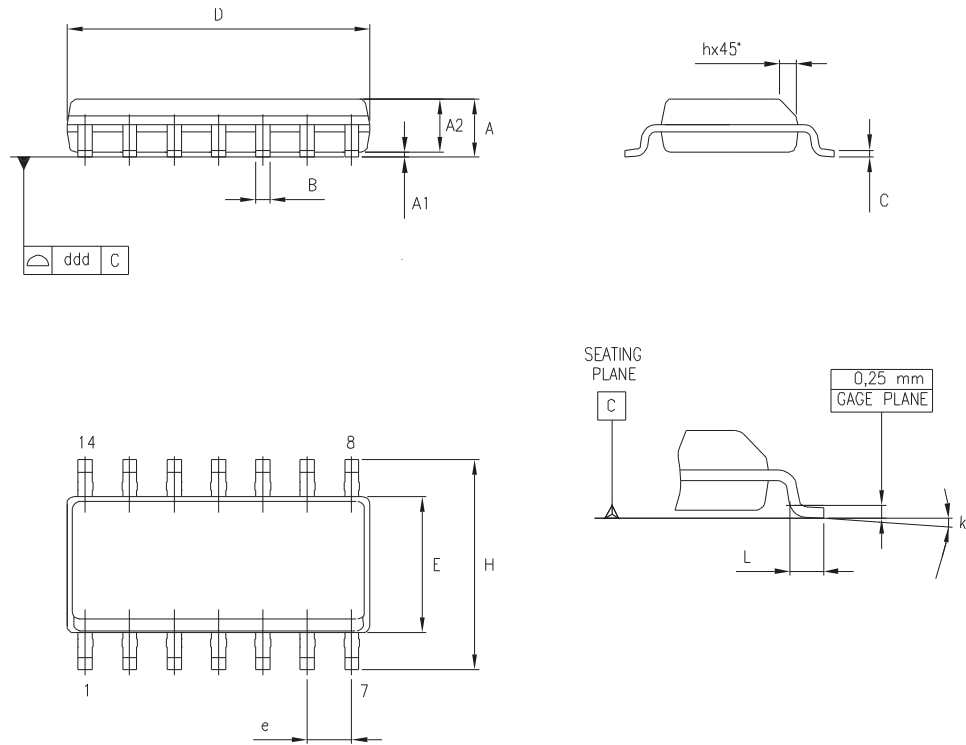


Table 5. SO8 package mechanical data

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

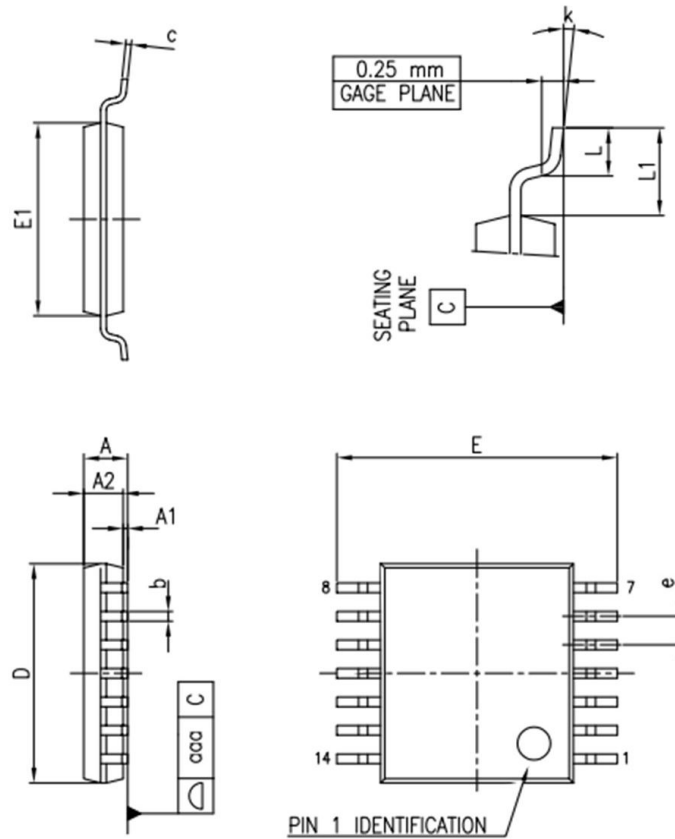


Table 7. TSSOP14 mechanical data

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 wetable 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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