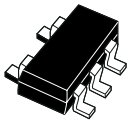
TSL6101

Datasheet

High bandwidth (5 MHz) rail-to-rail 5 V cost-effective op amp



TSL6101
SOT23-5

Features

- AEC-Q100 automotive qualification
- Gain bandwidth product 5 MHz, unity gain stable
- Rail-to-rail input and output
- Wide supply voltage range: 2.0 V to 5.5 V
- Input offset voltage: 1.5 mV
- Low input bias current: 1 pA typ.
- Extended temperature range: - 40 °C to +125 °C

Applications

- Cost-sensitive applications
- Current measurement sensors and signal conditioning
- Automotive signal conditioning

Maturity status link
TSL6101

Products	Channel	Automotive	Package
TSL6101ILT	1		SOT23-5
TSL6101IYLT	1	•	

Related products	
TSL6001	1 MHz rail-to-rail amplifier
TSL6201	8 MHz rail-to-rail amplifier

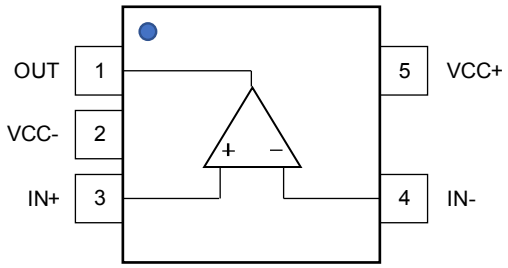
Description

The TSL6101 is a single 5 MHz-bandwidth unity-gain-stable amplifier. The rail-to-rail input stage and the wide supply range 2.0 V to 5.5 V make the TSL6101 ideal for low-voltage, high-bandwidth signal conditioning.

1 Pin description

1.1 TSL6101 single operational amplifier

Figure 1. Pin connections (top view)



SOT23-5

Table 1. Pin description

Pin n°	Pin name	Description
1	OUT	Output channel
2	VCC-	Negative supply voltage
3	IN+	Non-inverting input channel
4	IN-	Inverting input channel
5	VCC+	Positive supply voltage

2 Absolute maximum ratings and operating conditions

Table 2. Absolute maximum ratings

Symbol	Parameter [1]	Value	Unit
V_{CC}	Supply voltage	-0.3 to 6.0	V
V_{id}	Input voltage differential (V_{IN+} - V_{IN-}) [2]	$\pm V_{CC}$	V
V_{in}	Input voltage	(V_{CC-}) - 0.2 to (V_{CC+}) + 0.2	V
I_{in}	Input current	±10	mA
T_{stg}	Storage temperature	-65 to +150	°C
T_j	Maximum junction temperature	150	°C
$R_{th\text{-}ja}$ [3]	Thermal resistance junction-to-ambient		°C / W
	SOT23-5	250	
T_j	Maximum junction temperature	150	°C
ESD	HBM: human body model [4]	2	kV
	CDM: charged device model [5]	1	kV

1. *All voltage values are with respect to the VCC- pin, unless otherwise specified.*
2. *The maximum input voltage differential value may be extended to the condition that the input current is limited to ±10 mA.*
3. *$Rt_{h\text{-}ja}$ is a typical value, obtained with PCB according to JEDEC 2s2p without vias.*
4. *Human body model: the test HBM is done in accordance with the standards ESDA-JS-001-2017 and Q100-002.*
5. *Charged device model: the test CDM is done in accordance with the standards ESDA-JS-002-2018 and Q100-011.*

Table 3. Operating conditions

Symbol	Parameter	Value
V_{CC}	Supply voltage	2.0 V to 5.5 V
V_{icm}	Common-mode input voltage range	V_{CC-} – 0.1 V to V_{CC+} + 0.1 V
T_{oper}	Operating free air temperature range	-40 °C to +125 °C

3 Electrical characteristics

Table 4. Electrical characteristics at V_{CC} = 2 V to 5 V, V_{ICM} = V_{OUT} = V_{CC} / 2, T = 25 °C, R_L = 10 kΩ connected to V_{CC} / 2 and C_L = 47 pF (unless otherwise specified). Production screening at V_{CC} = 5 V, operation on the full supply range ensured by design and characterization.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
DC performance						
V_{io}	Input offset voltage				± 1.5	mV
$\Delta V_{io}/\Delta T$	Input offset voltage temperature drift	-40 °C ≤ T ≤ 125 °C		± 2		µV/°C
I_{ib}	Input bias current (1)			± 1		pA
I_{io}	Input offset current (1)			± 1		pA
A_{VD}	Open loop gain	V_{CC-} + 500 mV ≤ V_{OUT} ≤ V_{CC+} - 500 mV, V_{CC} = 5 V	80	95		dB
CMR	Common-mode rejection ratio 20.log ($\Delta V_{io}/\Delta V_{icm}$)	V_{CC-} - 100 mV ≤ V_{icm} ≤ V_{CC+} + 100 mV, V_{CC} = 5 V	55	75		dB
SVR	Supply-voltage rejection ratio 20.log($\Delta V_{io}/\Delta_{CC}V_{CC}$)	2.0 V ≤ V_{CC} ≤ 5.5 V, V_{icm} = 0 V		90		dB
V_{OH}	High level output voltage drop (V_{OH} = V_{CC+} - V_{OUT})	V_{CC} = 5 V			35	mV
V_{OL}	Low level output voltage drop (V_{OL} = V_{OUT})	V_{CC} = 5 V			35	mV
I_{OUT}		V_{CC} = 2 V		± 10		mA
		V_{CC} = 5 V		± 30		
I_{CC}	Supply current (per channel, R_L > 1 MΩ)	No load, -40 °C ≤ T ≤ 125 °C		0.8	1.1	mA
AC performance						
GBP	Gain bandwidth product			5		MHz
SR	Slew rate (2)	A_V = 1 V/V, 10% to 90%		3.5		V/µs
Φm	Phase margin			45		Degrees
en	Input voltage noise density	f = 10 kHz		21		nV/√Hz

1. *Guaranteed by design and characterization on a sample of parts, not tested in production.*
2. *Slew rate value is the average of rising and falling values.*

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 SOT23-5 package information

Figure 2. SOT23-5 package outline

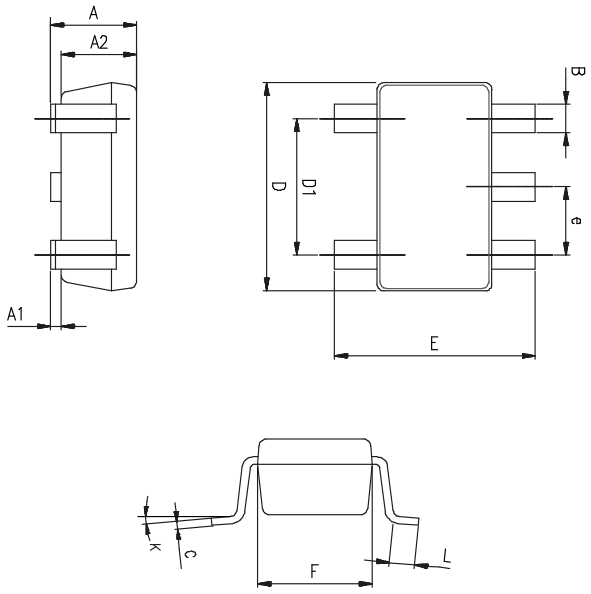


Table 5. SOT23-5 mechanical data

Dimensions						
Symbol	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90	1.20	1.45	0.035	0.047	0.057
A1			0.15			0.006
A2	0.90	1.05	1.30	0.035	0.041	0.051
B	0.35	0.40	0.50	0.014	0.016	0.020
C	0.09	0.15	0.20	0.004	0.006	0.008
D	2.80	2.90	3.00	0.110	0.114	0.118
D1		1.90			0.075	
e		0.95			0.037	
E	2.60	2.80	3.00	0.102	0.110	0.118
F	1.50	1.60	1.75	0.059	0.063	0.069
L	0.10	0.35	0.60	0.004	0.014	0.024
K	0°		0°	0°		0°

5 Ordering information

Table 6. Order code

Order code	Channel	Automotive	Package	Marking
TSL6101ILT	1		SOT23-5	K271
TSL6101IYLT	1	• (1)		K272

1. *Qualification and characterization according to AEC Q100 and Q003 or equivalent, advanced screening according to AEC Q001 & Q002 or equivalent. For qualification status detail, check " Maturity Status Link " on product page (" Quality & Reliability " tab on www.st.com).*

Revision history

Table 7. **Document revision history**

Date	Revision	Changes
10-Sep-2026	1	Initial release.

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