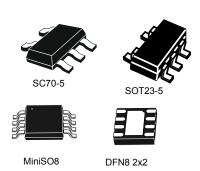


Rail-to-rail 0.9 V open-drain output, nanopower comparators



Features

- Ultra low current consumption: 250 nA typ./op.
- Propagation delay: 2 μs typ.
- · Rail-to-rail inputs
- · Open-drain outputs
- Supply operation from 0.9 V to 5.5 V
- Wide temperature range: -40 to +125 °C
- ESD tolerance: 8 kV HBM
- Single version available in SC70-5 and SOT23-5 package
- Dual version available in MiniSO8 and DFN8 2x2 mm package

Applications

- · Portable systems
- Signal conditioning
- Medical

Description

The open-drain series of nanopower comparator integrates a single version TS880 and a dual version TS883. They feature an ultra low supply current of 250 nA typical per operator with rail-to-rail input capability and open-drain output. The performance of these comparators allows them to be used in a wide range of portable applications. The TS880 and TS883 minimize battery supply leakage and therefore enhance battery lifetime.

Operating from 0.9 to 5.5V supply voltage, these comparators can be used over a wide temperature range (-40 to +125 $^{\circ}$ C) keeping the current consumption at an ultra low level.

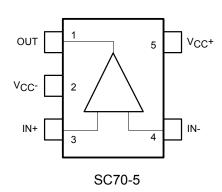
Product status link
TS880
TS883

, N	elateu products
TS881	
TS882	See the datasheet for push-pull output version
TS884	



1 Pin description

Figure 1. Pin connection TS880 (top view)



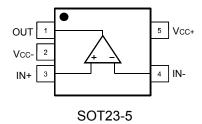
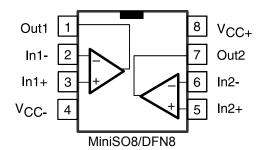


Figure 2. Pin connection TS883 (top view)



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2 Absolute maximum ratings and operating conditions

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{CC}	Supply voltage ⁽¹⁾ 6		V
V _{ID}	Differential input voltage ⁽²⁾	± V _{CC}	V
V _{IN}	Input voltage range	$(V_{CC}-)$ - 0.3 to $(V_{CC}+)$ + 0.3	V
I _{IN}	Input current ⁽³⁾	±10	mA
V _{OUT}	Output voltage	6	V
	Thermal resistance junction to ambient SC70-5	205	
	Thermal resistance junction to ambient SOT23-5	250	
R _{THJA}	Thermal resistance junction to ambient MiniSO8	190	°C/W
	Thermal resistance junction to ambient DFN8 2x2 mm	57	
T _{STG}	Storage temperature	-65 to +150	°C
TJ	Junction temperature	150	°C
T _{LEAD}	Lead temperature (soldering 10 s)	260	°C
ESD	Human body model (HBM) ⁽⁴⁾	8000	V
LSD	Charged device model (CDM) ⁽⁵⁾	1500	V

All voltage values, except differential voltages, are referenced to V_{CC}-. V_{CC} is defined as the difference between V_{CC}+ and V_{CC}-.

Table 2. Operating conditions

Symbol	Parameter	Value	Unit
T _{oper}	Operating temperature range	-40 to +125	°C
V _{CC}	Supply voltage	0.9 to 5.5	
V _{ICM}	Common mode input voltage range 0.9 < Vcc < 1.1 V ⁽¹⁾	and	
	Common mode input voltage range 1.1 ≤ Vcc < 5.5 V	(VCC-) - 0.2 to (VCC+) + 0.2	
V _{OUT}	Output voltage	0 to 5.5	V

See Figure 13. Input offset voltage vs. input common mode voltage, Vcc=0.9 V, Figure 14. Input hysteresis voltage vs. input common mode voltage, Vcc=0.9 V, Figure 27. Propagation delay T_{PLH} vs. input common mode voltage, Vcc=0.9 V and Figure 28. Propagation delay T_{PHL} vs. input common mode voltage, Vcc=0.9 V.

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^{2.} The magnitude of input and output voltages must never exceed the supply rail ±0.3 V.

^{3.} Input current must be limited by a serial resistor with inputs when the input voltage is beyond supply voltage.

^{4.} According to JEDEC standard JESD22-A114F.

^{5.} According to ANSI/ESD STM5.3.1.



3 Electrical characteristics

Table 3. Electrical characteristics V_{CC} = +0.9 V, T_{amb} = 25 °C, V_{ICM} = 0 V (unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V	(1)	T _{amb} = + 25 °C	-10	1	10	>/
V_{IO}	Input offset voltage (1)	-40 °C < T _{amb} < +85 °C	-12		12	- mV
ΔV_{IO}	Input offset voltage drift	-40 °C < T _{amb} < +85 °C		3		μV/°C
V	Input hysteresis voltage	T _{amb} = +25 °C		2.6		m)/
V _{HYST}	(2)	-40 °C < T _{amb} < +85 °C	1		4.2	- mV
L	In	T _{amb} = + 25 °C		1	10	0
I _{IO}	Input offset current (3)	-40 °C < T _{amb} < + 85 °C			100	pA
1	Input bigs surrent (3)	Tamb = + 25 °C		5	10	nΛ
I _{IB}	Input bias current (3)	- 40 °C < T _{amb} < + 85 °C			100	рA
		Output low, V _{ID} = - 0.1 V		300	480	
laa	Supply current per	- 40 °C < T _{amb} < + 85 °C			500	
I _{CC}	operator	Output high,V _{ID} = + 0.1 V		250	410	nA
		-40 °C < T _{amb} < + 85 °C			440	
I _{Sink}	Output sink current	V _{OUT} = V _{CC+} , V _{ID} = - 0.1 V		1.2		mA
Levi	I limb land a stant a sum of	V _{OUT} = V _{CC+} , V _{ID} = 0.1 V		17	30	рА
I _{OH}	High level output current	-40 °C < T _{amb} < + 85 °C			15	nA
\/ - ·		I _{sink} = 50 μA, V _{ID} = - 0.1 V		10	50	\
V_{OL}	Output voltage low	-40 °C < T _{amb} < + 85 °C			70	- mV
		f = 1 kHz, C _L = 10 pF, overdrive = 10 mV				
		$V_{PU} = V_{CC+}$				
		R _{PU} = 10 kΩ, T _{amb} = +25 °C		7	10	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			12	
		R _{PU} = 1 MΩ, T _{amb} = +25 °C		20	22	
-	Propagation delay (4)	R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			24	
T _{PLH}	(low to high)	f = 1 kHz, C _L = 10 pF, overdrive = 100 mV				μs
		$V_{PU} = V_{CC+}$				
		R _{PU} = 10 kΩ, T _{amb} = +25 °C		2.5	4	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			4.5	
		R _{PU} = 1 MΩ, T _{amb} = +25 °C		18	20	
		R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			21	

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Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
		f = 1 kHz, C _L = 10 pF, overdrive = 10 mV				
		$V_{PU} = V_{CC+}$				
		R _{PU} = 10 kΩ, T _{amb} = +25 °C		6	9	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			10	
		R _{PU} = 1 MΩ, T _{amb} = +25 °C		7	9	
_	Propagation delay ⁽⁵⁾ (high to low)	R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			10	
T _{PHL}		f = 1 kHz, C _L = 10 pF, overdrive = 100 mV				μs
		$V_{PU} = V_{CC+}$				
		R _{PU} = 10 kΩ, T _{amb} = +25 °C		2	3.5	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			4	
		R _{PU} = 1 MΩ, T _{amb} = +25 °C		2	4	
		R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			5	
T _R	Rise time (10% to 90%)	C_L = 10 pF, R_{PU} = 10 k Ω , overdrive = 100 mV		500		ns
T _F	Fall time (90% to 10%)	C_L = 10 pF, R_{PU} = 10 k Ω , overdrive = 100 mV		600		ns
T _{ON}	Power-up time			0.9	1.3	ms

- 1. The offset is defined as the average value of positive and negative trip points (input voltage differences requested to change the output state in each direction).
- 2. The hysteresis is a built-in feature. It is defined as the voltage difference between the trip points.
- 3. Maximum values include unavoidable inaccuracies of the industrial tests.
- 4. T_{PLH} is measured when the output signal crosses a voltage level at 50% of V_{CC} with the following conditions: inverting input voltage (IN-) = V_{ICM} and non-inverting input voltage (IN+) moving from V_{ICM} 100 mV to V_{ICM} + overdrive.
- 5. T_{PHL} is measured when the output signal crosses a voltage level at 50% of V_{CC} with the following conditions: inverting input voltage (IN-) = V_{ICM} and non-inverting input voltage (IN+) moving from V_{ICM} + 100 mV to V_{ICM} overdrive

Note: All values over the temperature range are guaranteed through correlation and simulation. No production test is performed at the temperature range limits.

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Table 4. Electrical characteristics V_{CC} = +1.2 V, T_{amb} = 25 °C, V_{ICM} = $V_{CC}/2$ (unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
Vis	In part off of the life of the	T _{amb} = + 25 °C	-5	1	5	mV
V_{IO}	Input offset voltage ⁽¹⁾	-40 °C < T _{amb} < +125 °C	-6		6	IIIV
ΔV_{IO}	Input offset voltage drift	-40 °C < T _{amb} < +125 °C		3		μV/°C
· · · · · · · · · · · · · · · · · · ·	Input hysteresis voltage	T _{amb} = +25 °C		2.5		> /
V _{HYST}	(2)	-40 °C < T _{amb} < +125 °C	1.6		4.2	mV
	1 (2)	T _{amb} = + 25 °C		2	10	0
I _{IO}	Input offset current (3)	-40 °C < T _{amb} < + 125 °C			100	pA
1	L	Tamb = + 25 °C		1	10	^
I _{IB}	Input bias current (3)	- 40 °C < T _{amb} < + 125 °C			100	рA
		Output low, V _{ID} = - 0.1 V		320	490	
	Supply current per	- 40 °C < T _{amb} < + 125 °C			510	
I _{CC}	operator	Output high,V _{ID} = + 0.1 V		240	360	nA
		-40 °C < T _{amb} < + 125 °C			390	
I _{Sink}	Output sink current	V _{OUT} = V _{CC+} , V _{ID} = - 0.1 V		3.6		mA
	I Eale I and a standard and a	V _{OUT} = V _{CC+} , V _{ID} = 0.1 V		22	36	36 pA
l _{OH}	High level output current	-40 °C < T _{amb} < + 125 °C			15	nA
		I _{sink} = 0.2 mA		25	50	
V_{OL}	Output voltage low	-40 °C < T _{amb} < + 125 °C			70	mV
01100	Common mode rejection	0 < V _{ICM} < V _{CC}		68		
CMRR	ratio	-40 °C < T _{amb} < + 125 °C	50			dB
		f = 1 kHz, C _L = 10 pF, overdrive = 10 mV				
		V _{PU} = V _{CC+}				
		R _{PU} = 10 kΩ,T _{amb} = + 25 °C		5	7.5	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < + 85 °C			8	
		R_{PU} = 1 M Ω , T_{amb} = + 25 °C		20	21	
_	Propagation delay	R _{PU} = 1 MΩ, -40 °C < T _{amb} < + 85 °C			22	Ī
T _{PLH}	(low to high)	f = 1 kHz, C _L = 10 pF, overdrive = 100 mV				μs
		V _{PU} = V _{CC+}				
		R _{PU} = 10 kΩ,T _{amb} = + 25 °C		1.9	3	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < + 85 °C			3.5	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		17	18	

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Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
		f = 1 kHz, C _L = 10 pF, overdrive = 10 mV				
		$V_{PU} = V_{CC+}$				
		R _{PU} = 10 kΩ, T _{amb} = + 25 °C		5	6.5	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < + 85 °C			7	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		5	6	
_	Propagation delay ⁽⁵⁾ (high to low)	R _{PU} = 1 MΩ, -40 °C < T _{amb} < + 85 °C			7	
T _{PHL}		f = 1 kHz, C _L = 10 pF, overdrive = 100 mV,				μs
		$V_{PU} = V_{CC+}$				
		R _{PU} = 10 kΩ,T _{amb} = + 25 °C		1.7	2.5	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < + 85 °C			3	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		2	3	
		R _{PU} = 1 MΩ, -40 °C < T _{amb} < + 85 °C			4	
T _R	Rise time (10% to 90%)	C_L = 10 pF, R_{PU} = 10 k Ω overdrive = 100 mV		800		ns
T _F	Fall time (90% to 10%)	C_L = 10 pF, R_{PU} = 10 k Ω overdrive = 100 mV		250		ns
T _{ON}	Power-up time			0.9	1.3	ms

- 1. The offset is defined as the average value of positive and negative trip points (input voltage differences requested to change the output state in each direction
- 2. The hysteresis is a built-in feature. It is defined as the voltage difference between the trip points.
- 3. Maximum values include unavoidable inaccuracies of the industrial tests.
- 4. T_{PLH} is measured when the output signal crosses a voltage level at 50% of V_{CC} with the following conditions: inverting input voltage (IN-) = V_{ICM} and non-inverting input voltage (IN+) moving from V_{ICM} 100 mV to V_{ICM} + overdrive.
- 5. T_{PHL} is measured when the output signal crosses a voltage level at 50% of V_{CC} with the following conditions: inverting input voltage (IN-) = V_{ICM} and non-inverting input voltage (IN+) moving from V_{ICM} + 100 mV to V_{ICM} overdrive.

Note: All values over the temperature range are guaranteed through correlation and simulation. No production test is performed at the temperature range limits.

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Table 5. Electrical characteristics V_{CC} = +2.7 V, T_{amb} = 25 °C, V_{ICM} = $V_{CC}/2$ (unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V	lancet offerst voltage	T _{amb} = + 25 °C	-5	1	5	mV
V_{IO}	Input offset voltage	-40 °C < T _{amb} < +125 °C	-6		6	1110
ΔV_{IO}	Input offset voltage drift	-40 °C < T _{amb} < +125 °C		3		μV/°C
\/	I	T _{amb} = +25 °C		2.7		>/
V _{HYST}	Input hysteresis voltage	-40 °C < T _{amb} < +125 °C	1.6		4.2	mV
	1 (2)	T _{amb} = + 25 °C		1	10	nΔ
I _{IO}	Input offset current (3)	-40 °C < T _{amb} < + 125 °C			100	pA
		Tamb = + 25 °C		5	10	^
I _{IB}	Input bias current (3)	- 40 °C < T _{amb} < + 125 °C			100	pA
		Output low, V _{ID} = - 0.1 V		350	520	
	Supply current per	- 40 °C < T _{amb} < + 125 °C			540	
Icc	operator	Output high, V _{ID} = + 0.1 V		250	370	nA
		-40 °C < T _{amb} < + 125 °C			400	
I _{Sink}	Output sink current	V _{OUT} = V _{CC+} , V _{ID} = - 0.1 V		22		mA
		V _{OUT} = V _{CC+} , V _{ID} = 0.1 V		40	60	pA
I _{OH}	High level output current	-40 °C < T _{amb} < + 125 °C			18	nA
.,		I _{sink} = 2 mA		140	220	.,
V_{OL}	Output voltage low	-40 °C < T _{amb} < + 125 °C			290	- mV
	Common mode rejection	0 < V _{ICM} < V _{CC}		74		
CMRR	ratio	-40 °C < T _{amb} < + 125 °C	55			dB
		f = 1 kHz, C _L = 10 pF, overdrive = 10 mV				
		V _{PU} = V _{CC+}				
		R _{PU} = 10 kΩ,T _{amb} = + 25 °C		5.8	8.5	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			10	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		21	23	
_	Propagation delay	R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			24	
T _{PLH}	(low to high)	f = 1 kHz, C _L = 10 pF, overdrive = 100 mV				μs
		V _{PU} = V _{CC+}				
		R _{PU} = 10 kΩ, T _{amb} = + 25 °C		2	3.3	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			3.5	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		18	19	
		R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			20	

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Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
		f = 1 kHz, C _L = 10 pF, overdrive = 10 mV				
		$V_{PU} = V_{CC+}$				
		R _{PU} = 10 kΩ, T _{amb} = + 25 °C		5.8	8.5	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			10	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		6	7	
_	Propagation delay (high to low)	R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			10	
T _{PHL}		f = 1 kHz, C _L = 10 pF, overdrive = 100 mV				μs
		V _{PU} = V _{CC+}				
		R _{PU} = 10 kΩ, T _{amb} = + 25 °C		1.9	3	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			3.5	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		2	3.5	
		R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			4.5	
T _R	Rise time (10% to 90%)	C_L = 10 pF, R_{PU} = 10 k Ω overdrive = 100 mV		1800		ns
T _F	Fall time (90% to 10%)	C_L = 10 pF, R_{PU} = 10 k Ω overdrive = 100 mV		170		ns
T _{ON}	Power-up time			0.9	1.3	ms

- 1. The offset is defined as the average value of positive and negative trip points (input voltage differences requested to change the output state in each direction
- 2. The hysteresis is a built-in feature. It is defined as the voltage difference between the trip points.
- 3. Maximum values include unavoidable inaccuracies of the industrial tests.
- 4. T_{PLH} is measured when the output signal crosses a voltage level at 50% of V_{CC} with the following conditions: inverting input voltage (IN-) = V_{ICM} and non-inverting input voltage (IN+) moving from V_{ICM} 100 mV to V_{ICM} + overdrive.
- 5. T_{PHL} is measured when the output signal crosses a voltage level at 50% of V_{CC} with the following conditions: inverting input voltage (IN-) = V_{ICM} and non-inverting input voltage (IN+) moving from V_{ICM} + 100 mV to V_{ICM} overdrive.

Note: All values over the temperature range are guaranteed through correlation and simulation. No production test is performed at the temperature range limits.

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Table 6. Electrical characteristics V_{CC} = +5 V, T_{amb} = 25 °C, V_{ICM} = $V_{CC}/2$ (unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
		T _{amb} = + 25 °C	-5	1	5	,,
V_{IO}	Input offset voltage	-40 °C < T _{amb} < +125 °C	-6		6	mV
ΔV_{IO}	Input offset voltage drift	-40 °C < T _{amb} < +125 °C		3		μV/°C
V	Input hysteresis voltage	T _{amb} = +25 °C		3.1		
V _{HYST}	(2)	-40 °C < T _{amb} < +125 °C	1.6		4.2	1.2 mV
	1 (2)	T _{amb} = + 25 °C		1	10	^
I _{IO}	Input offset current (3)	-40 °C < T _{amb} < + 125 °C			100	рA
		Tamb = + 25 °C		10	20	
I _{IB}	Input bias current (3)	- 40 °C < T _{amb} < + 125 °C			100	pA
		Output low, V _{ID} = - 0.1 V		400	600	
	Supply current per	- 40 °C < T _{amb} < + 125 °C			630	
I _{CC}	operator	Output high, V _{ID} = + 0.1 V		290	430	nA
		-40 °C < T _{amb} < + 125 °C			480	
I _{Sink}	Output sink current	V _{OUT} = V _{CC+} , V _{ID} = - 0.1 V		50		mA
		V _{OUT} = V _{CC+} , V _{ID} = 0.1 V		80	100	рА
I _{OH}		-40 °C < T _{amb} < + 125 °C			20	nA
		I _{sink} = 2 mA		110	180	
V_{OL}	Output voltage low	-40 °C < T _{amb} < + 125 °C			240	m\ 240
	Common mode rejection	0 < V _{ICM} < V _{CC}		78		
CMRR	ratio	-40 °C < T _{amb} < + 125 °C	55			dB
		ΔV _{CC} =1.2 V to 5 V		80		
SVR	Supply voltage rejection	-40 °C < T _{amb} < + 125 °C	65			dB
		f = 1 kHz, C _L = 10 pF, overdrive = 10 mV				
		V _{PU} = V _{CC+}				
		R _{PU} = 10 kΩ, T _{amb} = + 25 °C		7	11	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			13	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		21	23	
	Propagation delay (4)	R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			24	
T _{PLH}	(low to high)	f = 1 kHz, C _L = 10 pF, overdrive = 100 mV				μs
		V _{PU} = V _{CC+}				
		R _{PU} = 10 kΩ, T _{amb} = + 25 °C		3	4.4	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			5	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		18	20	
		R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			21	+

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Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
		f = 1 kHz, C _L = 10 pF, overdrive = 10 mV				
		$V_{PU} = V_{CC+}$				
		R _{PU} = 10 kΩ, T _{amb} = + 25 °C		7.5	11	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			12	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		9	11	
_	Propagation delay ⁽⁵⁾ (high to low)	R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			13	
T _{PHL}		f = 1 kHz, C _L = 10 pF, overdrive = 100 mV				μs
		V _{PU} = V _{CC+}				
		R _{PU} = 10 kΩ, T _{amb} = + 25 °C		2	3.3	
		R _{PU} = 10 kΩ, 40 °C < T _{amb} < +85 °C			3.5	
		R _{PU} = 1 MΩ, T _{amb} = + 25 °C		2	3	
		R _{PU} = 1 MΩ, -40 °C < T _{amb} < +85 °C			4	
T _R	Rise time (10% to 90%)	C_L = 10 pF, R_{PU} = 10 kΩ overdrive = 100 mV		3.7		μs
T _F	Fall time (90% to 10%)	$C_L = 10 \text{ pF}, R_{PU} = 10 \text{ k}\Omega \text{ overdrive} = 100 \text{ mV}$		190		ns
T _{ON}	Power-up time			0.9	1.3	ms

- 1. The offset is defined as the average value of positive and negative trip points (input voltage differences requested to change the output state in each direction).
- 2. The hysteresis is a built-in feature. It is defined as the voltage difference between the trip points.
- 3. Maximum values include unavoidable inaccuracies of the industrial tests
- 4. T_{PLH} is measured when the output signal crosses a voltage level at 50% of V_{CC} with the following conditions: inverting input voltage (IN-) = V_{ICM} and non-inverting input voltage (IN+) moving from V_{ICM} 100 mV to V_{ICM} + overdrive.
- 5. T_{PHL} is measured when the output signal crosses a voltage level at 50% of V_{CC} with the following conditions:inverting input voltage (IN-) = V_{ICM} and non-inverting input voltage (IN+) moving from V_{ICM} + 100 mV to V_{ICM} overdrive.

Note: All values over the temperature range are guaranteed through correlation and simulation. No production test is performed at the temperature range limits.

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4 Typical characteristics and curves

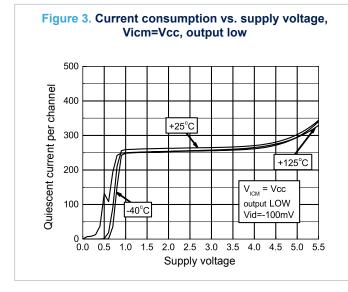


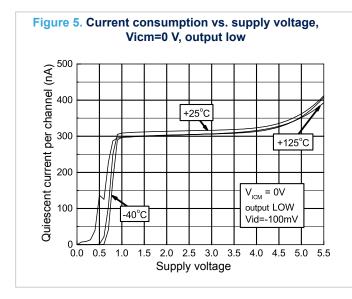
Figure 4. Current consumption vs. supply voltage, Vicm=Vcc, output high

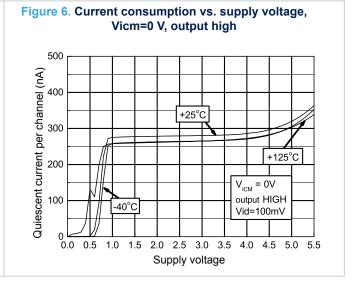
(YU) 400 V_{ICM} = Vcc output HIGH Vid=100mV

200 +25°C +125°C

0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5

Supply voltage





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Figure 7. Current consumption vs. input common mode voltage, Vcc=0.9 V, output low

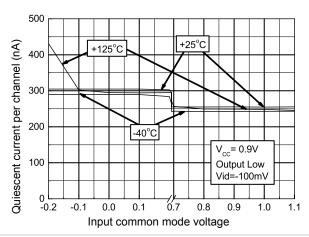


Figure 8. Current consumption vs. input common mode voltage, Vcc=0.9 V, output high

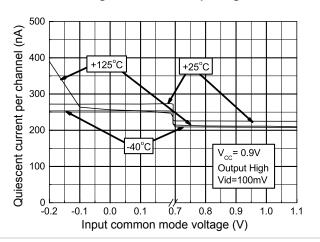


Figure 9. Current consumption vs. input common mode voltage, Vcc=5 V, output low

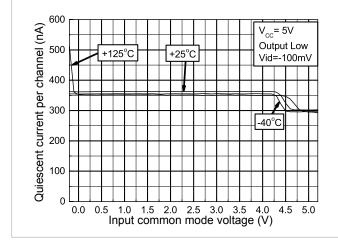


Figure 10. Current consumption vs. input common mode voltage, Vcc=5 V, output high

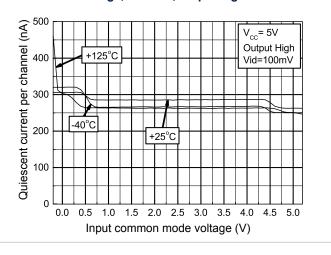


Figure 11. Current consumption vs. temperature

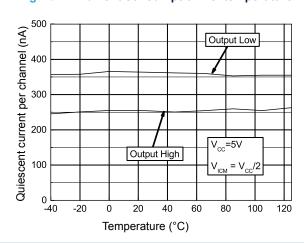
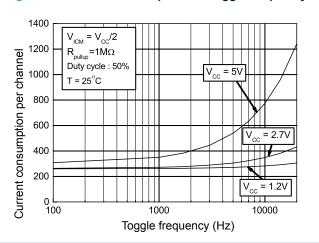


Figure 12. Current consumption vs. toggle frequency



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Figure 13. Input offset voltage vs. input common mode voltage, Vcc=0.9 V

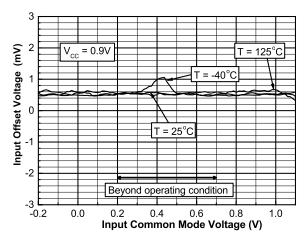


Figure 14. Input hysteresis voltage vs. input common mode voltage, Vcc=0.9 V

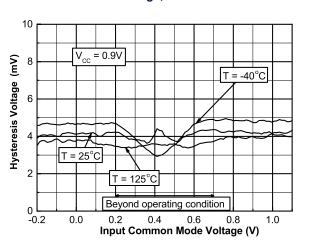


Figure 15. Input offset voltage vs. input common mode voltage, Vcc=1.2 V

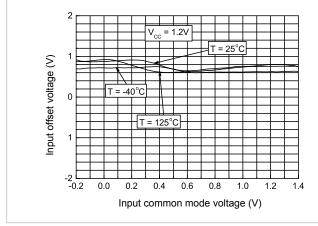


Figure 16. Input hysteresis voltage vs. input common mode voltage, Vcc=1.2 V

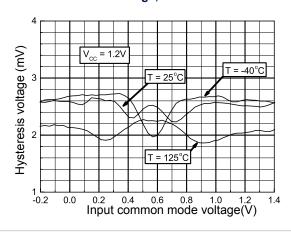


Figure 17. Input offset voltage vs. input common mode voltage, Vcc=5 V

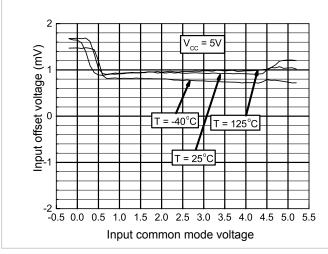
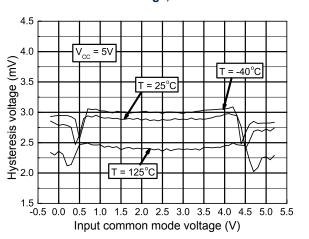


Figure 18. Input hysteresis voltage vs. input common mode voltage, Vcc=5 V



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-2 **└** -40

-20

Figure 19. Input offset voltage vs. temperature Input offset voltage (mV) = 1.2V

20

40

Temperature (°C)

= 5V

60

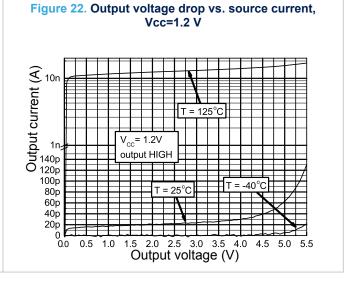
80

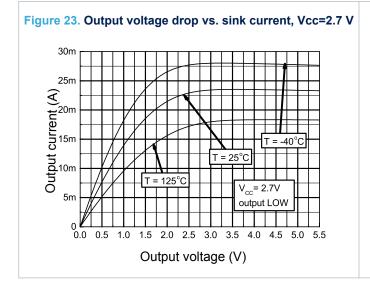
100

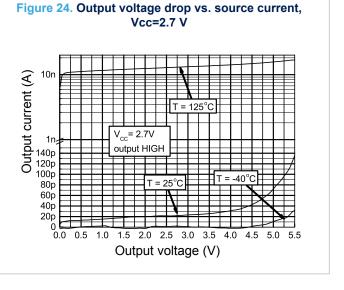
120

Figure 20. Input hysteresis voltage vs. temperature $V_{CC} = 5V$ Hysteresis voltage (mV) = V 1 -40 -20 100 120 Temperature (°C)

Figure 21. Output voltage drop vs. sink current, Vcc=1.2 V V_{cc}= 1.2V output LOW 4m Output current (A) 3m 1m 0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 Output voltage (V)



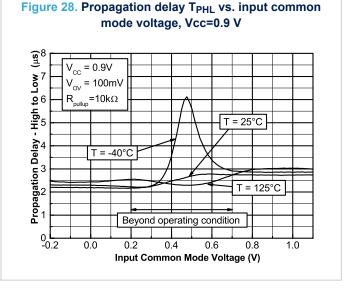


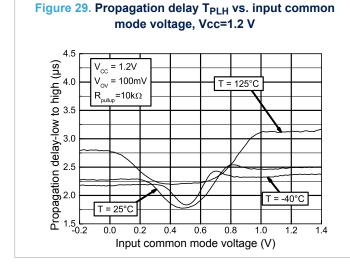


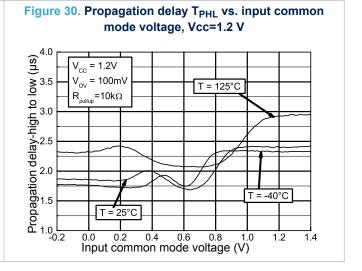
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Figure 27. Propagation delay T_{PLH} vs. input common mode voltage, Vcc=0.9 V (<u>si</u>) $V_{CC} = 0.9V$ Propagation Delay - Low to High V_{ov} = 100mV R_{pullup} =10k Ω T = 25°C T = 125°C $T = -40^{\circ}C$ Beyond operating condition 0.2 0.0 0.2 0.4 0.6 0.8 1.0 Input Common Mode Voltage (V)







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Figure 31. Propagation delay T_{PLH} vs. input common mode voltage, Vcc=5 V

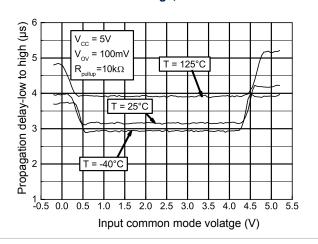


Figure 32. Propagation delay T_{PHL} vs. input common mode voltage, Vcc=5 V

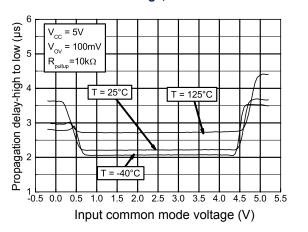


Figure 33. Propagation delay T_{PLH} vs. input signal overdrive, Vcc=1.2 V

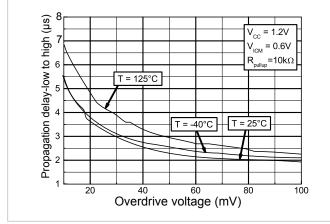


Figure 34. Propagation delay T_{PHL} vs. input signal overdrive, Vcc=1.2 V

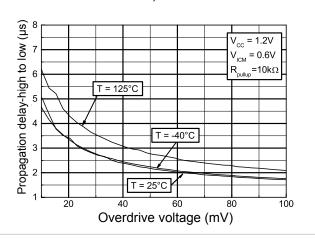


Figure 35. Current consumption Vs. input common mode voltage, Vcc=0.9 V, output low

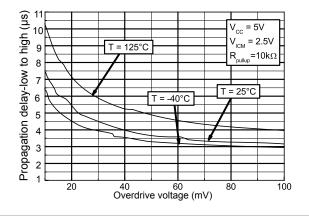
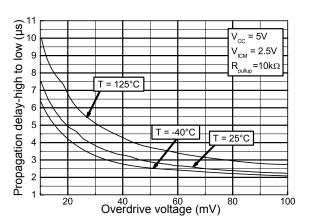


Figure 36. Current consumption Vs. input common mode voltage, Vcc=0.9 V, output high



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Figure 37. Propagation delay T_{PLH} vs. input signal overdrive, Vcc=5 V

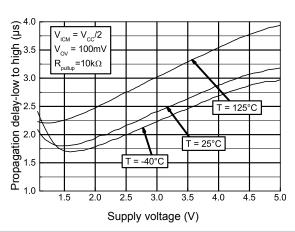


Figure 38. Propagation delay T_{PHL} vs. input signal overdrive, Vcc=5 V

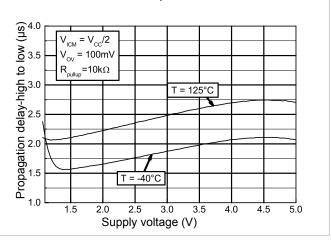


Figure 39. Propagation delay T_{PLH} vs. supply voltage

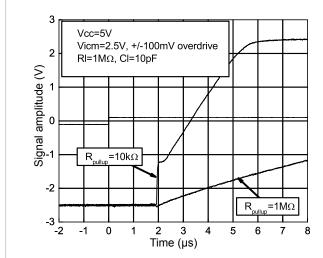
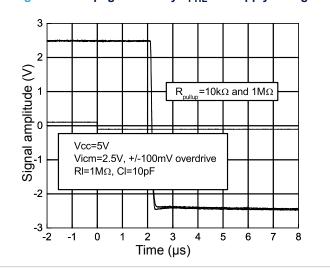


Figure 40. Propagation delay T_{PHL} vs. supply voltage



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5 Ordering information

Table 7. Order code

Order code	Temp. range	Package	Packing	Marking
TS880ICT		SC70-5	Tape and reel	K5P
TS880ILT	40 to 1425 °C	SOT23-5		K534
TS883IST	-40 to +125 °C	MiniSO8		KEO
TS883IQ2T		DFN8 2x2 mm		K5Q

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6 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.

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6.1 SC70-5 (or SOT323-5) package information

GAUGE PLANE

GAUGE

Figure 41. SC70-5 (or SOT323-5) package outline

Table 8. SC70-5 (or SOT323-5) package mechanical data

	Dimensions					
Ref.	Millimeters			Inches		
	Min.	Тур.	Max.	Min.	Тур.	Max.
А	0.80		1.10	0.032		0.043
A1			0.10			0.004
A2	0.80	0.90	1.00	0.032	0.035	0.039
b	0.15		0.30	0.006		0.012
С	0.10		0.22	0.004		0.009
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.80	2.10	2.40	0.071	0.083	0.094
E1	1.15	1.25	1.35	0.045	0.049	0.053
е		0.65			0.025	
e1		1.30			0.051	
L	0.26	0.36	0.46	0.010	0.014	0.018
<	0°		8°	0°		8°

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6.2 SOT23-5 package information

Figure 42. SOT23-5 package outline

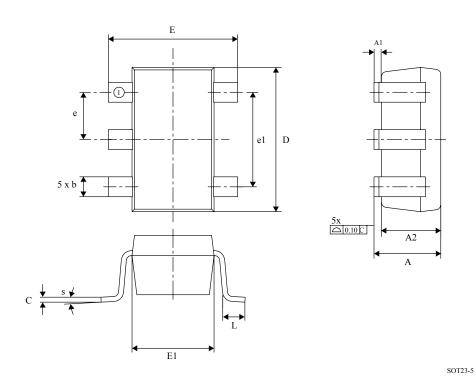


Table 9. SOT23-5 mechanical data

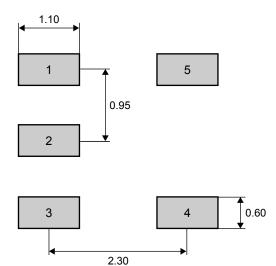
Symbol		Milimeters		Inches ⁽¹⁾		
Syllibol	Min.	Тур.	Max.	Min.	Тур.	Max.
А			1.45			0.057
A1	0.00		0.15	0.000		0.006
A2	0.90	1.15	1.30	0.035	0.045	0.051
b	0.30		0.50	0.012		0.020
С	0.08		0.22	0.003		0.009
D		2.90			0.114	
E		2.80			0.110	
E1		1.60			0.063	
е		0.95			0.037	
e1		1.90			0.075	
L	0.30	0.45	0.60	0.012	0.018	0.024
θ	0	4	8	0	4	8

^{1.} Values in inches are converted from mm and rounded to 4 decimal digits.

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Figure 43. SOT23-5 recommended footprint



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6.3 DFN8 2x2 package information

Figure 44. DFN8 2x2 package outline

Table 10. DFN8 2x2 package mechanical data

	Dimensions						
Ref.	Millimeters			Inches			
	Min.	Тур.	Max.	Min.	Тур.	Max.	
А	0.51	0.55	0.60	0.020	0.022	0.024	
A1			0.05			0.002	
A3		0.15			0.006		
b	0.18	0.25	0.30	0.007	0.010	0.012	
D	1.85	2.00	2.15	0.073	0.079	0.085	
D2	1.45	1.60	1.70	0.057	0.063	0.067	
E	1.85	2.00	2.15	0.073	0.079	0.085	
E2	0.75	0.90	1.00	0.030	0.035	0.039	
е		0.50			0.020		
L	0.225	0.325	0.425	0.009	0.013	0.017	
ddd			0.08			0.003	

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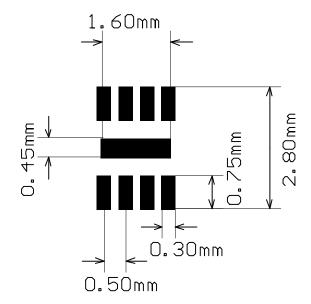


Figure 45. DFN8 2x2 recommended footprint

Note: The exposed pad of the DFN8 2x2 can be connected to VCC- or left floating.

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6.4 MiniSO8 package information

PIN 1 IDENTIFICATION

PIN 1 IDENTIFICATION

PIN 1 IDENTIFICATION

PLANE

C

GAUGE PLANE

L1

L2

K

Figure 46. MiniSO8 package outline

Table 11. MiniSO8 mechanical data

Dim.	Millimeters			Inches		
	Min.	Тур.	Max.	Min.	Тур.	Max.
А			1.1			0.043
A1	0		0.15	0		0.006
A2	0.75	0.85	0.95	0.03	0.033	0.037
b	0.22		0.4	0.009		0.016
С	0.08		0.23	0.003		0.009
D	2.8	3	3.2	0.11	0.118	0.126
E	4.65	4.9	5.15	0.183	0.193	0.203
E1	2.8	3	3.1	0.11	0.118	0.122
е		0.65			0.026	
L	0.4	0.6	0.8	0.016	0.024	0.031
L1		0.95			0.037	
L2		0.25			0.01	
k	0°		8°	0°		8°
ccc			0.1			0.004

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Revision history

Table 12. Document revision history

Date	Version	Changes
16-Apr-2019	1	Initial release.
24-May-2019	2	Updated Table 4. Electrical characteristics V_{CC} = +1.2 V, T_{amb} = 25 °C, V_{ICM} = $V_{CC}/2$ (unless otherwise specified), Table 5. Electrical characteristics V_{CC} = +2.7 V, T_{amb} = 25 °C, V_{ICM} = $V_{CC}/2$ (unless otherwise specified) and Table 6. Electrical characteristics V_{CC} = +5 V, T_{amb} = 25 °C, V_{ICM} = $V_{CC}/2$ (unless otherwise specified).

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