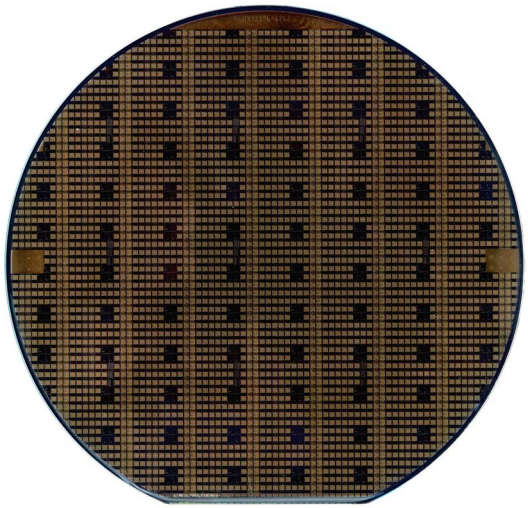
JTS3702

Micropower dual CMOS voltage comparator: unsawn wafer

Datasheet - production data



Unsawn wafer

Related products

- See TS3702 for plastic packaged version

Description

The JTS3702 is a micro power CMOS dual voltage comparator with an extremely low consumption of 9 µA typical per comparator (20 times less than the bipolar LM393). The push-pull CMOS output stage allows power and space saving by eliminating the external pull-up resistor required by usual open-collector output comparators. Thus, response times remain similar to the LM393.

Features

- Push-pull CMOS output (no external pull-up resistor required)
- Extremely low supply current: 9 µA typ per comparator
- Wide single supply range: 2.7 V to 16 V or dual supplies (±1.35 V to ±8 V)
- Extremely low input bias current: 1 pA typ
- Extremely low input offset current: 1 pA typ
- Input common-mode voltage range includes GND
- High input impedance: $10^{12}\,\Omega$ typ
- Fast response time: 2 µs typ for 5 mV overdrive
- Functionally compatible with bipolar LM393

Contents

1 Schematic diagram and pad configuration

Figure 1. Schematic diagram (for one channel of JTS3702)

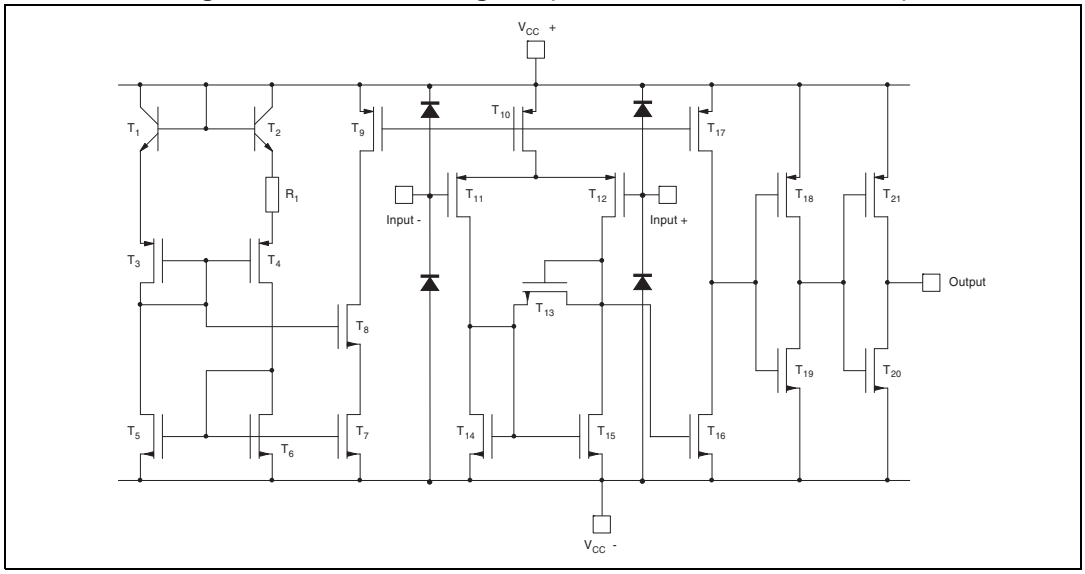


Figure 2. Pad configuration (top view)

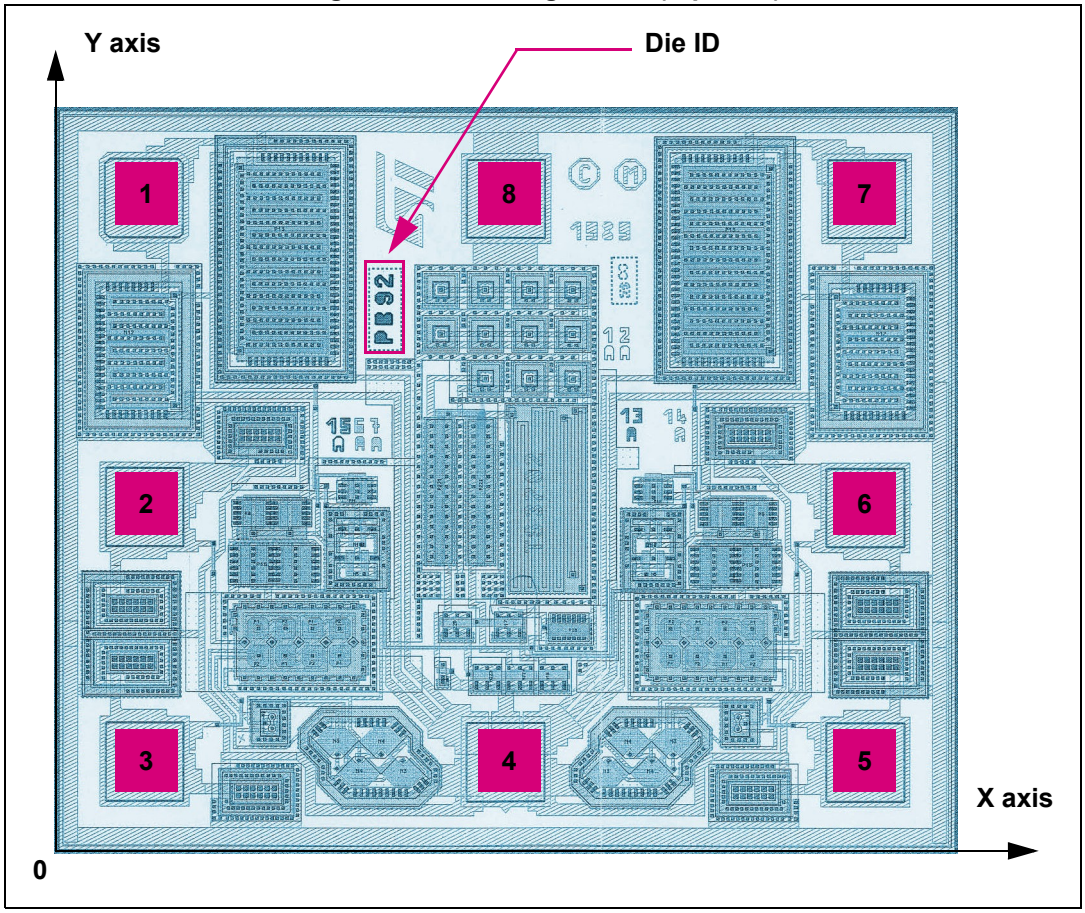


Table 1. Pad coordinates (pad placement origin is the lower left corner of the die)

Pad number	Pad description	Center pad coordinates	
		X (µm)	Y (µm)
1	Output 1	140	1065.3
2	Inverting input 1	140	565.3
3	Non-inverting input 1	140	165.3
4	Vcc-	665	165.3
5	Non-inverting input 2	1190	165.3
6	Inverting input 2	1190	565.3
7	Output 2	1190	1065.3
8	Vcc+	665	1065.3

Wafer dimension: 6 inches

Die size without scribe line:

- X = 1306.0 µm
- Y = 1076.0 µm

Scribe line: 60 µm

Bond pad opening 109 x 109 µm

2 Absolute maximum ratings and operating conditions

Table 2. Absolute maximum ratings (AMR)

Symbol	Parameter	Value	Unit
V_{CC}^+	Supply voltage(1)	18	V
V_{id}	Differential input voltage(2)	±18	
V_i	Input voltage(3)	18	
V_o	Output voltage	18	
I_o	Output current	20	mA
I_F	Forward current in ESD protection diodes on Input(4)	50	
T_{stg}	Storage temperature range	-65 to +150	°C
ESD	HBM: human body model(5)	400	V
	MM: machine model(6)	50	

1. All voltage values, except differential voltage, are with respect to network ground terminal.
2. Differential voltages are the non-inverting input terminal with respect to the inverting input terminal.
3. The magnitude of the input and the output voltages must never exceed the magnitude of the positive and negative supply voltages.
4. Guaranteed by design.
5. Human body model: 100 pF discharged through a 1.5 kΩ resistor between two pins of the device, done for all couples of pin combinations with other pins floating.
6. Machine model: a 200 pF cap is charged to the specified voltage, then discharged directly between two pins of the device with no external series resistor (internal resistor < 5 Ω), done for all couples of pin combinations with other pins floating.

Table 3. Operating conditions

Symbol	Parameter	Value	Unit
V_{CC}^+	Supply voltage	2.7 to 16	V
V_{icm}	Common mode input voltage range $T_{min.} \leq T_{amb} \leq T_{max}$	0 to V_{CC}^+ -1.2 0 to V_{CC}^+ -1.5	
T_{oper}	Operating free-air temperature range - JTS3702C	0 to +70	°C

3 Electrical characteristics

Table 4. Electrical characteristics at V_{CC+} = 3 V, V_{CC-} = 0 V, T = 25 °C (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage(1)	V_{ic} = 1.5 V $T_{min.} \leq T_{amb} \leq T_{max}$			5 6.5	mV
I_{io}	Input offset current(2)	V_{ic} = 1.5 V $T_{min.} \leq T_{amb} \leq T_{max.}$		1	300	pA
I_{ib}	Input bias current(2)	V_{ic} = 1.5 V $T_{min.} \leq T_{amb} \leq T_{max.}$		1	600	pA
CMR	Common-mode rejection ratio	$V_{ic} = V_{icm\ min.}$		80		dB
SVR	Supply voltage rejection ratio	V_{CC}^{+} = 3 V to 5 V		75		dB
V_{OH}	High level output voltage	V_{id} = 1 V, I_{OH} = -4 mA $T_{min.} \leq T_{amb} \leq T_{max.}$	2 1.8	2.4		V
V_{OL}	Low level output voltage	V_{id} = -1 V, I_{OL} = 4 mA $T_{min.} \leq T_{amb} \leq T_{max.}$		300	400 575	mV
I_{CC}	Supply current (each comparator)	No load - outputs low $T_{min.} \leq T_{amb} \leq T_{max.}$		7	20 25	µA
t_{PLH}	Response time low to high	V_{ic} = 0 V, f = 10 kHz, C_L = 50 pF, Overdrive = 5 mV TTL input		1.5 0.7		µs
t_{PHL}	Response time high to low	V_{ic} = 0V, f = 10 kHz, C_L = 50 pF, Overdrive = 5 mV TTL input		2.2 0.15		µs

1. The specified offset voltage is the maximum value required to drive the output up to 2.5 V or down to 0.3 V.
2. Maximum values including unavoidable inaccuracies of the industrial test.

Table 5. Electrical characteristics at V_{CC+} = 5 V, V_{CC-} = 0 V, T = 25 °C (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage(1)	V_{ic} = $V_{icm\ min.}$, V_{cc}^+ = 5 V to 10 V $T_{min.} \leq T_{amb} \leq T_{max.}$		1.2	5 6.5	mV
I_{io}	Input offset current(2)	V_{ic} = 2.5 V $T_{min.} \leq T_{amb} \leq T_{max.}$		1	 300	pA
I_{ib}	Input bias current(2)	V_{ic} = 2.5 V $T_{min.} \leq T_{amb} \leq T_{max.}$		1	 600	
CMR	Common-mode rejection ratio	V_{ic} = $V_{icm\ min.}$		82		dB
SVR	Supply voltage rejection ratio	V_{CC}^+ = +5 V to +10 V		90		
V_{OH}	High level output voltage	V_{id} = 1 V, I_{OH} = -4 mA $T_{min.} \leq T_{amb} \leq T_{max.}$	4.5 4.3	4.7		V
V_{OL}	Low level output voltage	V_{id} = -1 V, I_{OL} = 4 mA $T_{min.} \leq T_{amb} \leq T_{max.}$		200	300 375	mV
I_{CC}	Supply current (each comparator)	No load - outputs low $T_{min.} \leq T_{amb} \leq T_{max.}$		9	20 25	µA
t_{PLH}	Response time low to high	V_{ic} = 0 V, f = 10 kHz, C_L = 50 pF, Overdrive = 5 mV Overdrive = 10 mV Overdrive = 20 mV Overdrive = 40 mV TTL input		 1.5 1.1 0.9 0.7 0.6		µs
t_{PHL}	Response time high to low	V_{ic} = 0 V, f = 10 kHz, C_L = 50 pF, Overdrive = 5 mV Overdrive = 10 mV Overdrive = 20 mV Overdrive = 40 mV TTL input		 2.2 1.6 1.1 0.75 0.17		
t_f	Fall time	f = 10 kHz, C_L = 50 pF, overdrive 50 mV		30		ns

1. The specified offset voltage is the maximum value required to drive the output up to 4.5 V or down to 0.3 V.
2. Maximum values including unavoidable inaccuracies of the industrial test.

4 Packing description

Collective packing is used as STMicroelectronics qualified system for shipment of finished wafers.

The following parts of the collective packing are used in the clean room (see *Figure 3* for detailed view):

- Canister (composed of a base and a cover, maximum content is 25 wafers)
- Pink foam discs (lodged below and over the stack, minimum content is 2 discs)
- White interleaves (separators between wafers, maximum content is 26 or more for best fit)
- CMB bag (to protect canister under moderate vacuum)

Figure 3. Canister composition overview

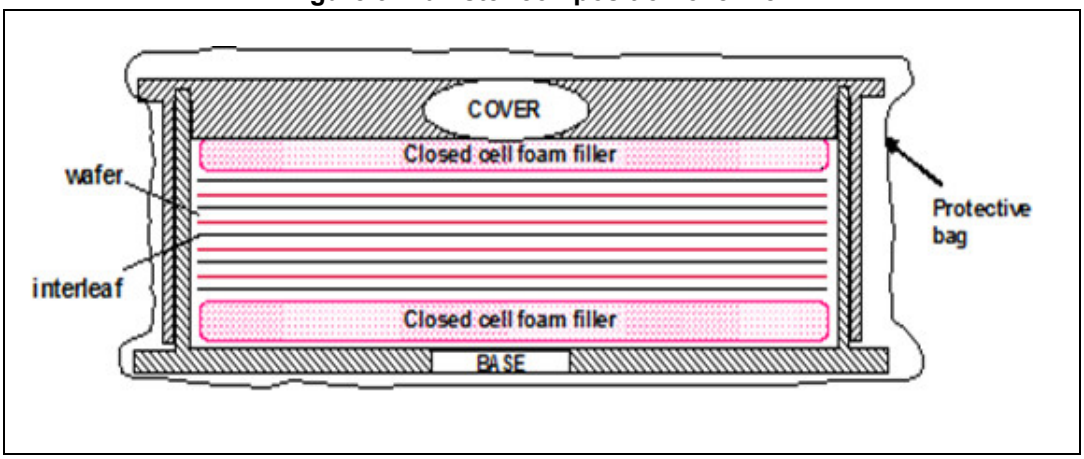


Figure 4. Packed canister picture

5 Ordering information

Table 6. Order codes

Order code	Temperature range	Package	Packaging
JTS3702C-1AA5	0 to +70 °C	Unsawn wafer	Collective packing

6 Revision history

Table 7. Document revision history

Date	Revision	Changes
06-Dec-2013	1	Initial release.

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