TOSHIBA CMOS Linear Integrated Circuit Silicon Monolithic

# TC75S59F,TC75S59FU,TC75S59FE

### Single Comparator

The TC75S59F/TC75S59FU/TC75S59FE is a CMOS general-purpose single comparator. The device can operate off a single power supply and draws a lower supply current than a conventional bipolar general-purpose comparator. This device's open-drain output stage can be wire-ORed with those of other open-drain output circuits.

#### **Features**

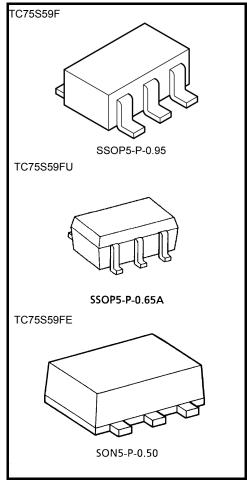
• Low-current power supply :  $IDD = 100 \mu A \text{ (typ.)}$ 

Single power supply operation

• Wide common mode input voltage range: VSS~VDD - 0.9 V

• Open drain output circuit

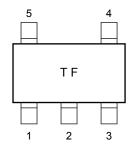
- Low input bias current
- Small package



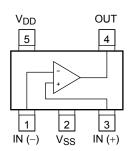
Weight

SSOP5-P-0.95 : 0.014 g (typ.) SSOP5-P-0.65A : 0.006 g (typ.) SON5-P-0.50 : 0.003 g (typ.)

#### Marking (top view)



### Pin Connection (top view)



### Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit	
Supply voltage		V <sub>DD</sub> , V <sub>SS</sub>	±3.5 or 7	V	
Differential input voltage		DV <sub>IN</sub>	±7	٧	
Input voltage		V <sub>IN</sub>	V <sub>SS</sub> ~V <sub>DD</sub>	V	
Output current		Io	±35	mA	
Power dissipation	TC75S59F/FU	P <sub>D</sub>	200	mW	
	TC75S59FE	۲۵	100		
Operating temperature		T <sub>opr</sub>	-40~85	°C	
Storage temperature		T <sub>stg</sub>	-55~125	°C	

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note: This device's CMOS structure makes it prone to latch-up. To prevent latch-up, please take the following precautions:

- Ensure that no I/O pin's voltage level ever exceeds V<sub>DD</sub> or drops below V<sub>SS</sub>.
   In addition, check the power-on timing.
- Do not subject the device to excessive noise.



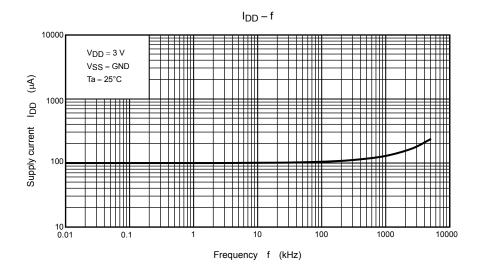
### Electrical Characteristics ( $V_{DD} = 5 V$ , $V_{SS} = GND$ , Ta = 25°C)

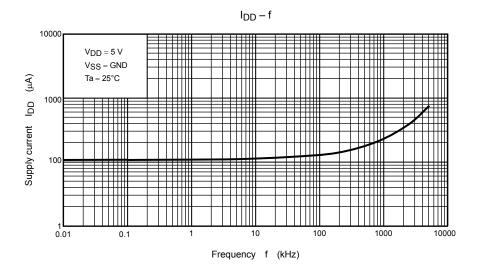
Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Input offset voltage	V <sub>IO</sub>	_	_	_	±1	±7	mV
Input offset current	I <sub>IO</sub>	_	_	_	1	_	pА
Input bias current	lį	_	_	_	1	_	pА
Common mode input voltage	CMV <sub>IN</sub>	_	_	0	_	4.1	V
Supply current	I <sub>DD</sub> (Note)	_	_	_	110	220	μА
Voltage gain	G <sub>V</sub>	_	_	_	94	_	dB
Sink current	I <sub>sink</sub>	_	V <sub>OL</sub> = 0.5 V	13	25	_	mA
Output leak current	I <sub>LEAK</sub>	_	V <sub>O</sub> = 5 V	_	5	_	nA
Output voltage	V <sub>OL</sub>	_	I <sub>sink</sub> = 5.0 mA	_	0.1	0.3	V
Operating supply voltage	$V_{DD}$	_	_	1.8	_	7.0	V
Propagation delay time (turn on)	t <sub>PLH</sub> (1)	_	Over drive = 100 mV	_	200	_	ns
Propagation delay time (turn on)	t <sub>PLH</sub> (2)	_	TTL step input	_	140	_	
Propagation delay time (turn off)	t <sub>PHL</sub> (1)	_	Over drive = 100 mV	_	80	_	- ns
	t <sub>PHL</sub> (2)	_	TTL step input	_	60	_	
Response time	tTLH	_	Over drive = 100 mV	_	160	_	- ns
	t <sub>THL</sub>		Over drive = 100 mV		3		

## Electrical Characteristics (V<sub>DD</sub> = 3 V, V<sub>SS</sub> = GND, Ta = 25°C)

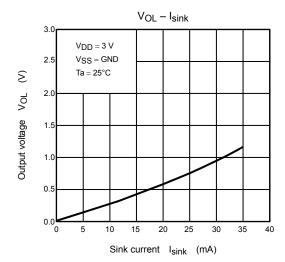
Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Input offset voltage	V <sub>IO</sub>	_	_	_	±1	±7	mV
Input offset current	I <sub>IO</sub>	_	_	_	1	_	pА
Input bias current	lį	_	_	_	1	_	pA
Common mode input voltage	CMV <sub>IN</sub>	_	_	0	_	2.1	V
Supply current	I <sub>DD</sub> (Note)	_	_	_	100	200	μА
Sink current	I <sub>sink</sub>	_	V <sub>OL</sub> = 0.5 V	6	18	_	mA
Output leak current	I <sub>LEAK</sub>	_	V <sub>O</sub> = 3 V	_	5	_	nA
Output voltage	V <sub>OL</sub>	_	I <sub>sink</sub> = 5.0 mA	_	0.15	0.35	V
Propagation delay time (turn on)	t <sub>PLH</sub>	_	Over drive = 100 mV	_	160	_	ns
Propagation delay time (turn off)	t <sub>PHL</sub>	_	Over drive = 100 mV	_	70	_	ns
Response time	t <sub>TLH</sub>	_	Over drive = 100 mV	_	170	_	no
	t <sub>THL</sub>	_	Over drive = 100 mV	_	3	_	ns

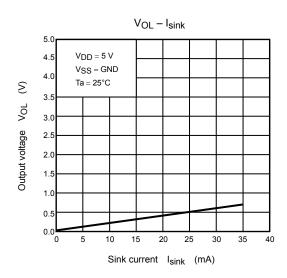
Note: This device's current consumption increases as its operating frequency increases. Note that the power dissipation should not exceed the allowable power dissipation.

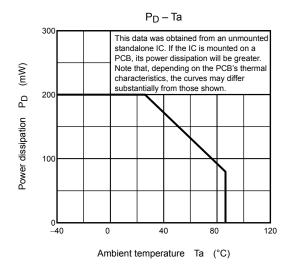




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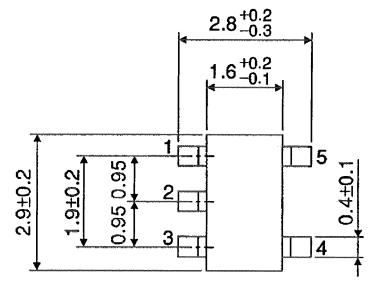


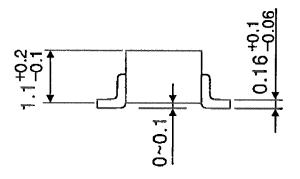




### **Package Dimensions**

SSOP5-P-0.95 Unit: mm



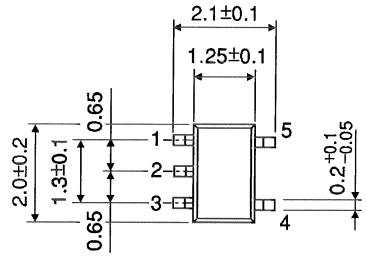


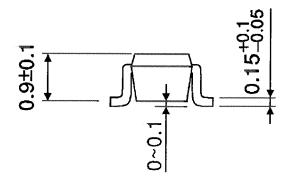
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Weight: 0.014 g (typ.)

### **Package Dimensions**

SSOP5-P-0.65A Unit: mm



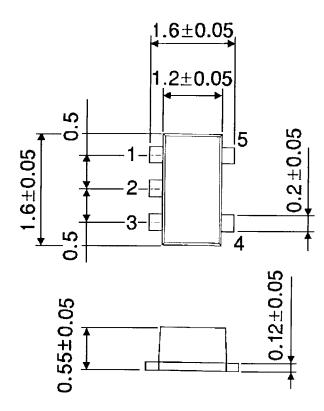


Weight: 0.006 g (typ.)



### **Package Dimensions**

SON5-P-0.50 Unit: mm



Weight: 0.003 g (typ.)

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