

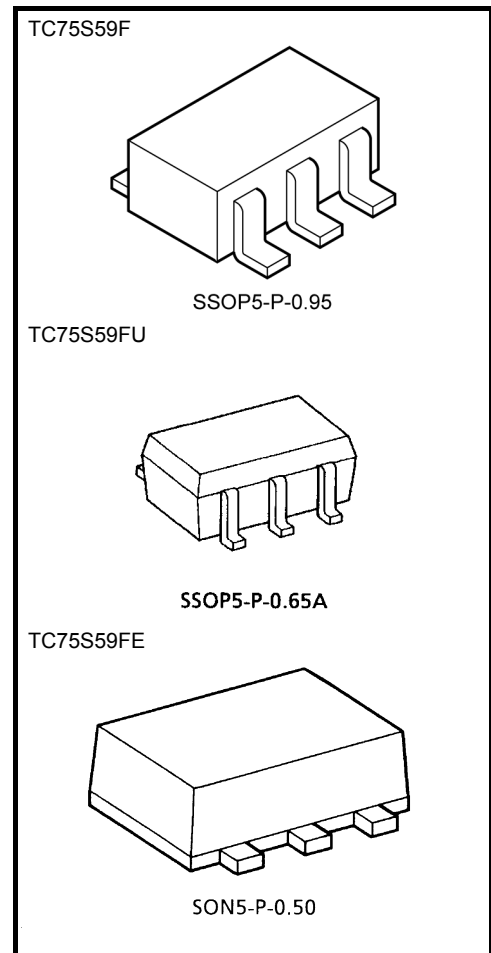
# TC75S59F, TC75S59FU, TC75S59FE

## 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 :  $I_{DD} = 100 \mu A$  (typ.)
- Single power supply operation
- Wide common mode input voltage range:  $V_{SS}$  to  $V_{DD} - 0.9 V$
- Open drain output circuit
- Low input bias current
- Small package



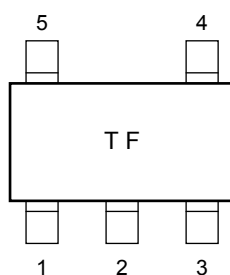
#### Weight

SSOP5-P-0.95 : 0.014 g (typ.)

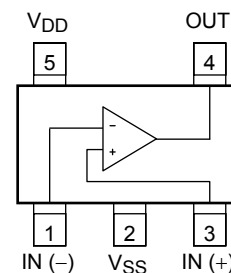
SSOP5-P-0.65A : 0.006 g (typ.)

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		$V_{DD}, V_{SS}$	$\pm 3.5$ or 7	V
Differential input voltage		$DV_{IN}$	$\pm 7$	V
Input voltage		$V_{IN}$	$V_{SS}$ to $V_{DD}$	V
Output current		$I_O$	$\pm 35$	mA
Power dissipation	TC75S59F/FU	$P_D$	200	mW
	TC75S59FE		100	
Operating temperature		$T_{opr}$	-40 to 85	°C
Storage temperature		$T_{stg}$	-55 to 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  $V_{DD}$  or drops below  $V_{SS}$ .  
In addition, check the power-on timing.
- Do not subject the device to excessive noise.

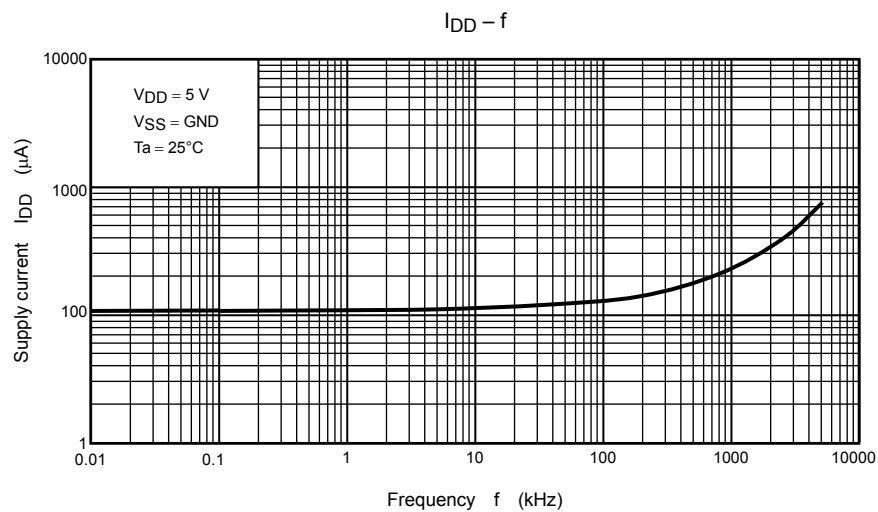
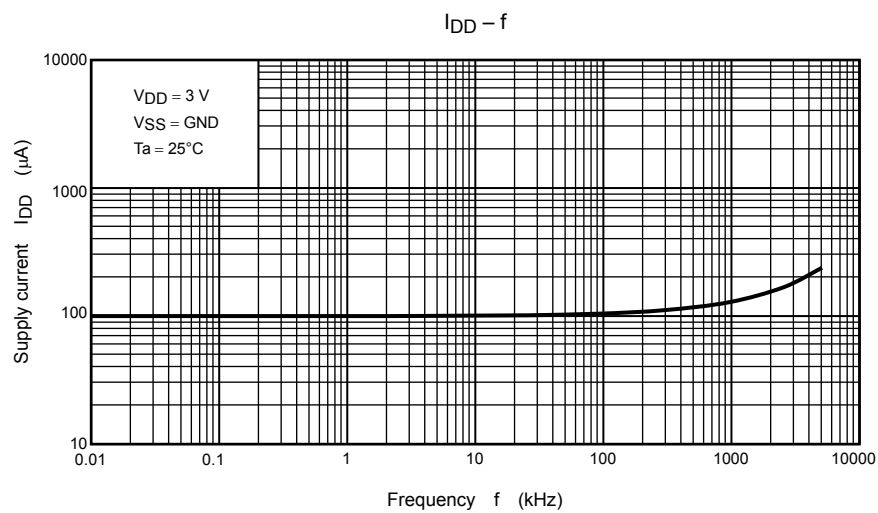
**Electrical Characteristics ( $V_{DD} = 5\text{ V}$ ,  $V_{SS} = \text{GND}$ ,  $T_a = 25^\circ\text{C}$ )**

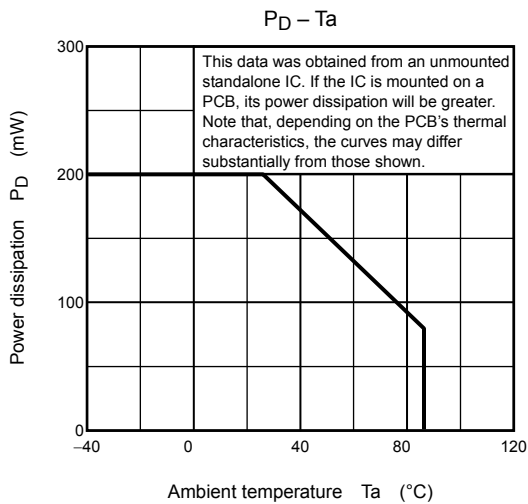
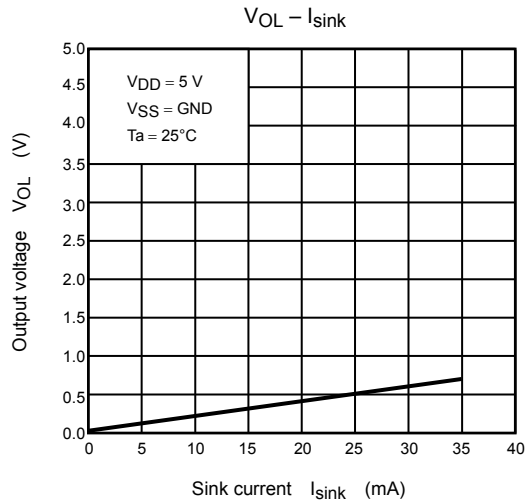
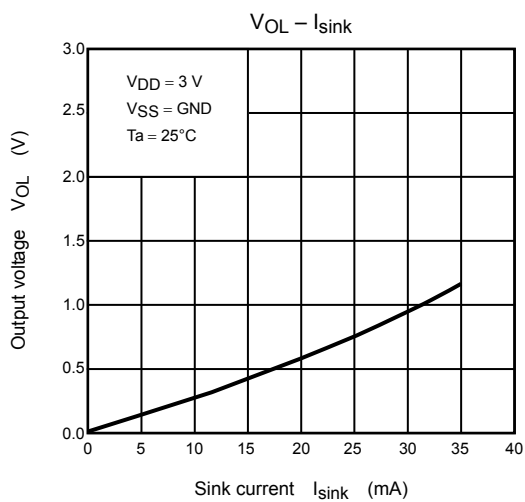
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input offset voltage	$V_{IO}$	—	—	—	$\pm 1$	$\pm 7$	mV
Input offset current	$I_{IO}$	—	—	—	1	—	pA
Input bias current	$I_I$	—	—	—	1	—	pA
Common mode input voltage	$CMV_{IN}$	—	—	0	—	4.1	V
Supply current	$I_{DD}$ (Note)	—	—	—	110	220	$\mu\text{A}$
Voltage gain	$G_V$	—	—	—	94	—	dB
Sink current	$I_{sink}$	—	$V_{OL} = 0.5\text{ V}$	13	25	—	mA
Output leak current	$I_{LEAK}$	—	$V_O = 5\text{ V}$	—	5	—	nA
Output voltage	$V_{OL}$	—	$I_{sink} = 5.0\text{ mA}$	—	0.1	0.3	V
Operating supply voltage	$V_{DD}$	—	—	1.8	—	7.0	V
Propagation delay time (turn on)	$t_{PLH}$ (1)	—	Over drive = 100 mV	—	200	—	ns
	$t_{PLH}$ (2)	—	TTL step input	—	140	—	
Propagation delay time (turn off)	$t_{PHL}$ (1)	—	Over drive = 100 mV	—	80	—	ns
	$t_{PHL}$ (2)	—	TTL step input	—	60	—	
Response time	$t_{TLH}$	—	Over drive = 100 mV	—	160	—	ns
	$t_{THL}$	—	Over drive = 100 mV	—	3	—	

**Electrical Characteristics ( $V_{DD} = 3\text{ V}$ ,  $V_{SS} = \text{GND}$ ,  $T_a = 25^\circ\text{C}$ )**

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input offset voltage	$V_{IO}$	—	—	—	$\pm 1$	$\pm 7$	mV
Input offset current	$I_{IO}$	—	—	—	1	—	pA
Input bias current	$I_I$	—	—	—	1	—	pA
Common mode input voltage	$CMV_{IN}$	—	—	0	—	2.1	V
Supply current	$I_{DD}$ (Note)	—	—	—	100	200	$\mu\text{A}$
Sink current	$I_{sink}$	—	$V_{OL} = 0.5\text{ V}$	6	18	—	mA
Output leak current	$I_{LEAK}$	—	$V_O = 3\text{ V}$	—	5	—	nA
Output voltage	$V_{OL}$	—	$I_{sink} = 5.0\text{ mA}$	—	0.15	0.35	V
Propagation delay time (turn on)	$t_{PLH}$	—	Over drive = 100 mV	—	160	—	ns
Propagation delay time (turn off)	$t_{PHL}$	—	Over drive = 100 mV	—	70	—	ns
Response time	$t_{TLH}$	—	Over drive = 100 mV	—	170	—	ns
	$t_{THL}$	—	Over drive = 100 mV	—	3	—	

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

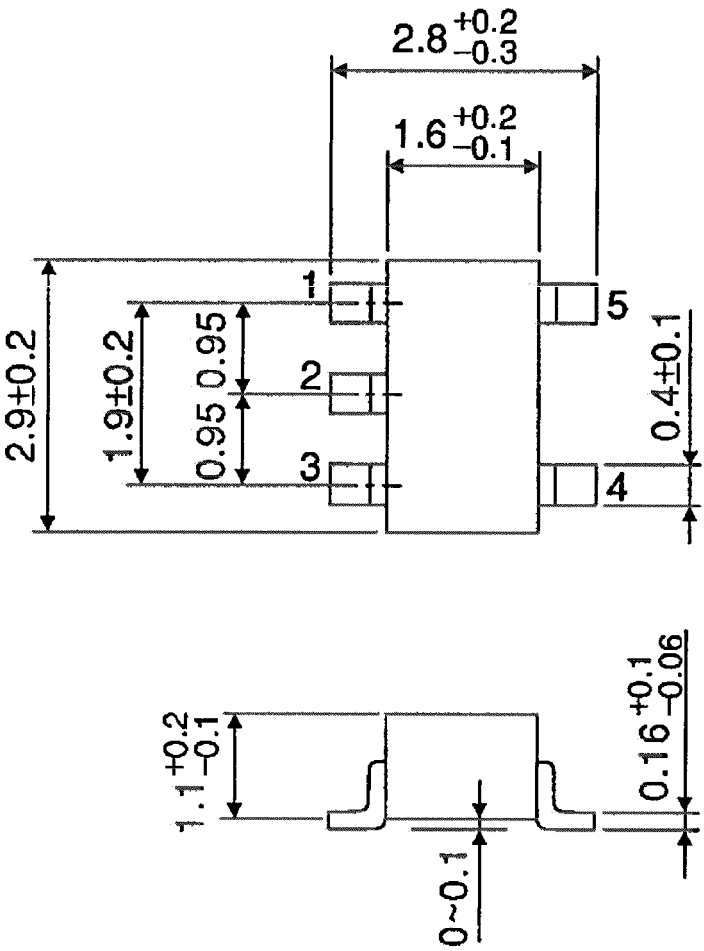




Package Dimensions

SSOP5-P-0.95

Unit : mm

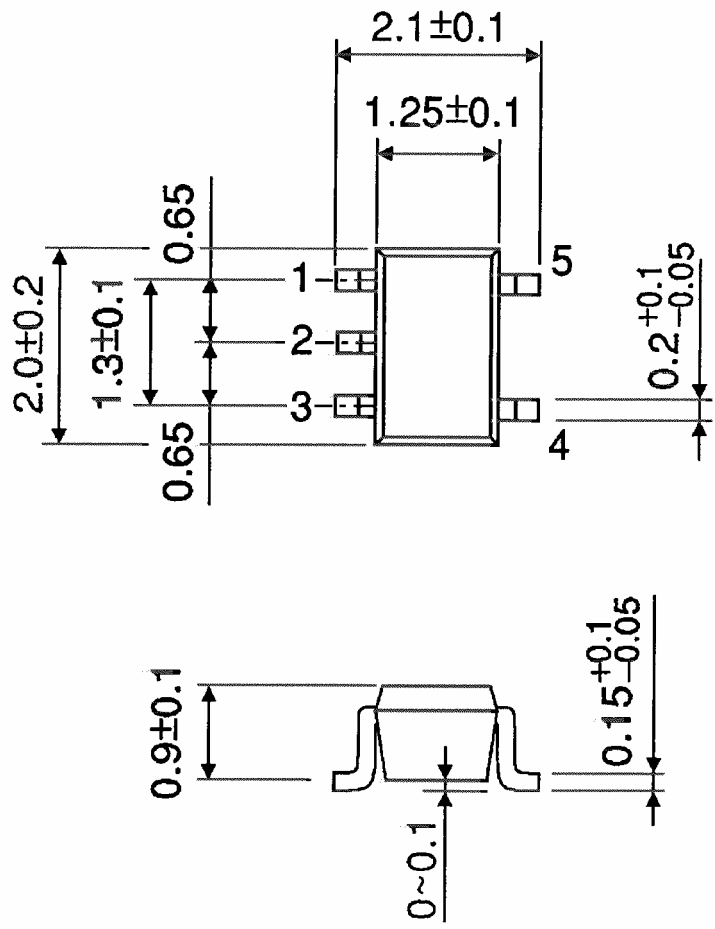


Weight: 0.014 g (typ.)

Package Dimensions

SSOP5-P-0.65A

Unit : mm

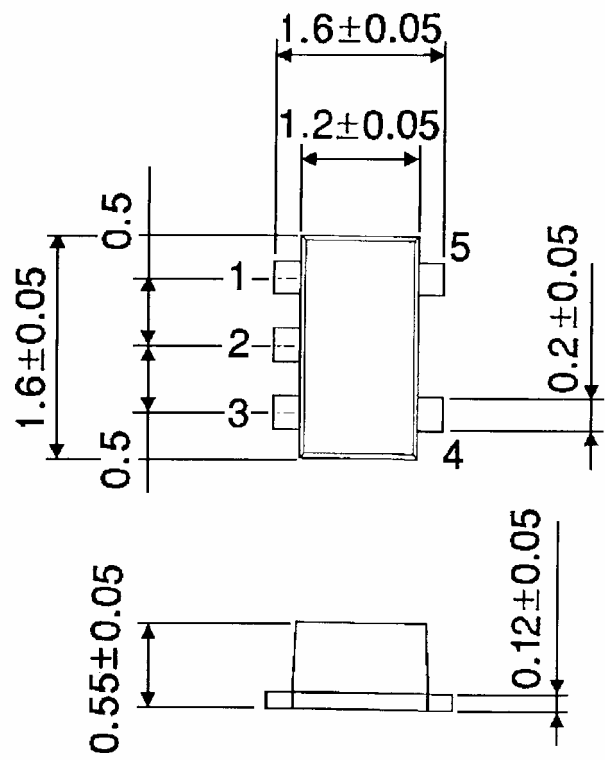


Weight: 0.006 g (typ.)

Package Dimensions

SON5-P-0.50

Unit : mm



Weight: 0.003 g (typ.)



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