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.
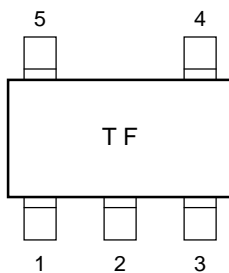
Features

- Low-current power supply   : I_{DD} = 100 μA (typ.)
- Single power supply operation
- Wide common mode input voltage range: V_{SS}~V_{DD} − 0.9 V
- Open drain output circuit
- Low input bias current
- Small package

TC75S59F

SSOP5-P-0.95

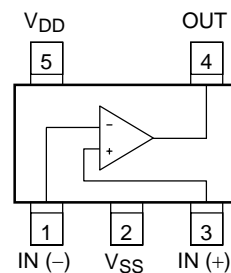TC75S59FU

SSOP5-P-0.65A

TC75S59FE
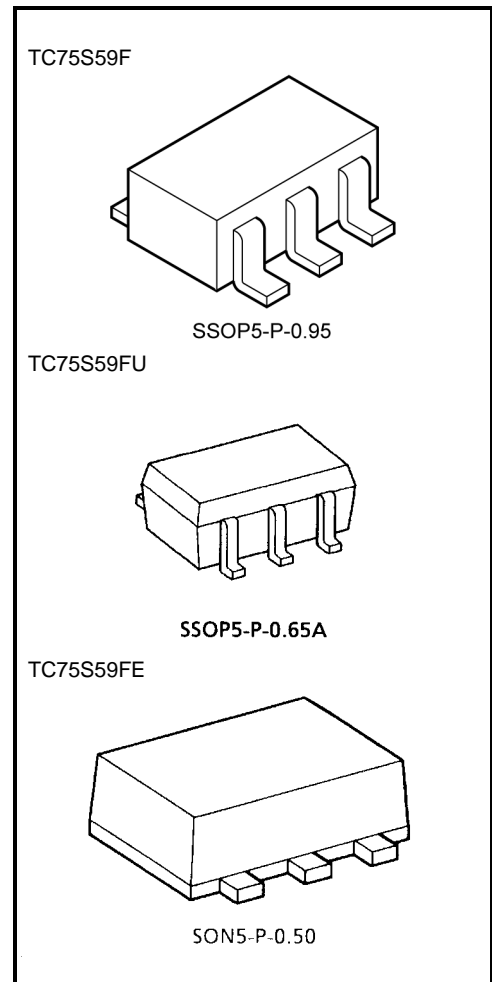
SON5-P-0.50

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)

2002-02-20

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Supply voltage		V_{DD}, V_{SS}	±3.5 or 7	V
Differential input voltage		DV_{IN}	±7	V
Input voltage		V_{IN}	V_{SS}~V_{DD}	V
Output current		I_O	±35	mA
Power dissipation	TC75S59F/FU	P_D	200	mW
	TC75S59FE		100	
Operating temperature		T_{opr}	−40~85	°C
Storage temperature		T_{stg}	−55~125	°C

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.
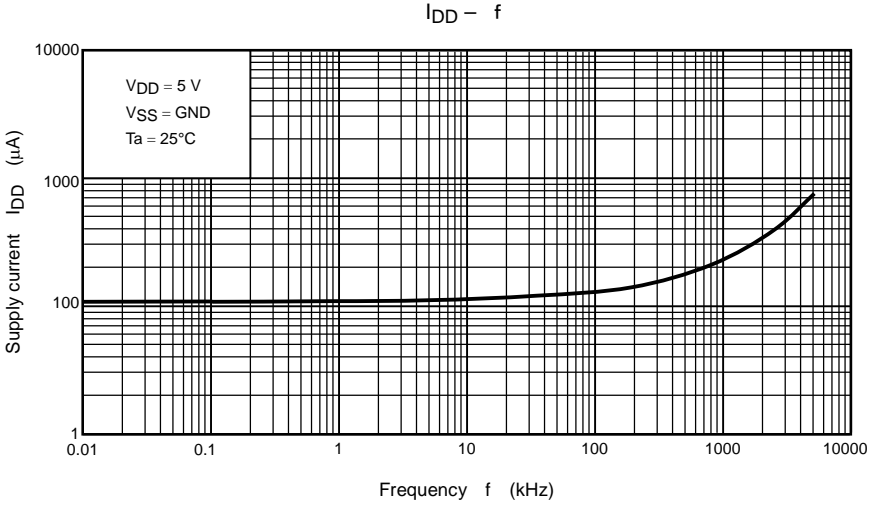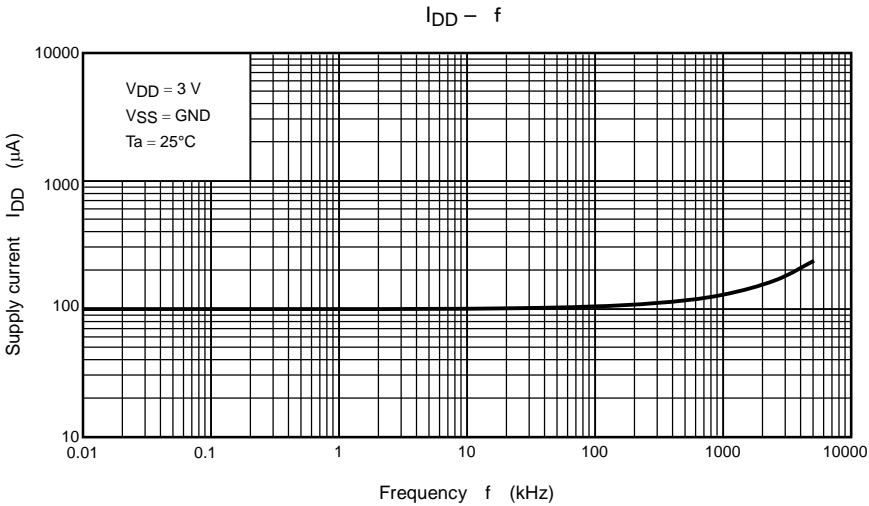
- Do not subject the device to excessive noise.

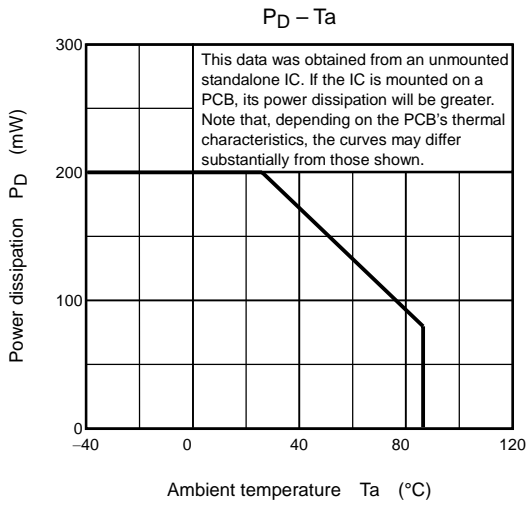## Electrical Characteristics (V_{DD} = 5 V, V_{SS} = GND, Ta = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input offset voltage	V_{IO}	—	—	—	±1	±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	μA
Voltage gain	G_V	—	—	—	94	—	dB
Sink current	I_{sink}	—	V_{OL} = 0.5 V	13	25	—	mA
Output leak current	I_{LEAK}	—	V_O = 5 V	—	5	—	nA
Output voltage	V_{OL}	—	I_{sink} = 5.0 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 V, V_{SS} = GND, Ta = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input offset voltage	V_{IO}	—	—	—	±1	±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	μA
Sink current	I_{sink}	—	V_{OL} = 0.5 V	6	18	—	mA
Output leak current	I_{LEAK}	—	V_O = 3 V	—	5	—	nA
Output voltage	V_{OL}	—	I_{sink} = 5.0 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.
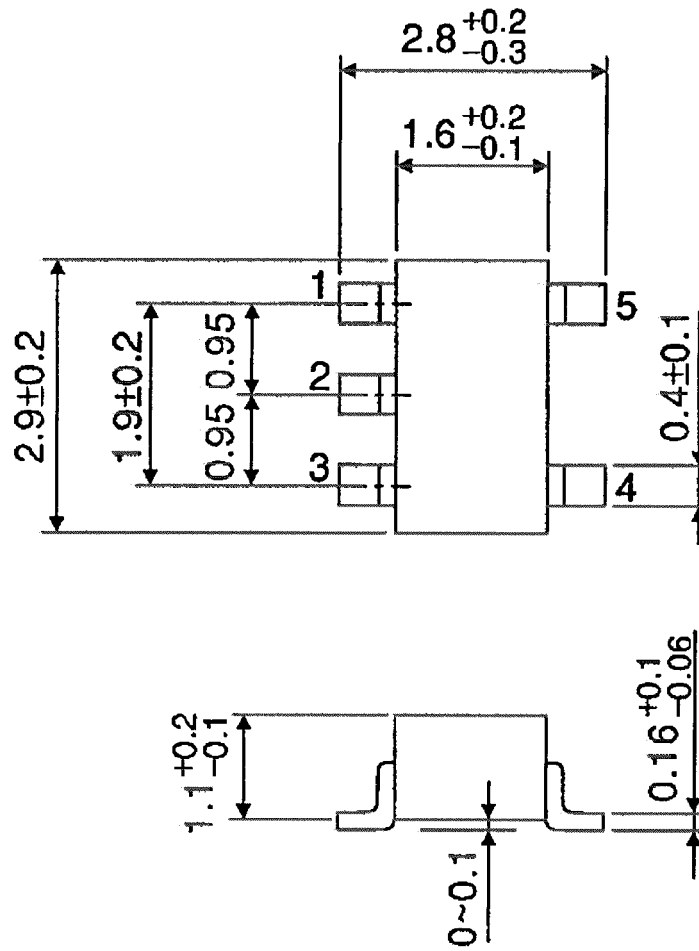
$I_{DD} - f$

Graph: Supply current I_{DD} (μA) vs Frequency f (kHz)

$V_{DD} = 3\ V$
$V_{SS} = GND$
$Ta = 25°C$

$I_{DD} - f$

Graph: Supply current I_{DD} (μA) vs Frequency f (kHz)

$V_{DD} = 5\ V$
$V_{SS} = GND$
$Ta = 25°C$

$V_{OL} - I_{sink}$

Output voltage V_{OL} (V)

V_{DD} = 3 V
V_{SS} = GND
Ta = 25°C

Sink current I_{sink} (mA)

$V_{OL} - I_{sink}$

Output voltage V_{OL} (V)

V_{DD} = 5 V
V_{SS} = GND
Ta = 25°C

Sink current I_{sink} (mA)

$P_D - Ta$

Power dissipation P_D (mW)

This data was obtained from an unmounted standalone IC. If the IC is mounted on a PCB, its power dissipation will be greater. Note that, depending on the PCB's thermal characteristics, the curves may differ substantially from those shown.

Ambient temperature Ta (°C)

Package Dimensions

SSOP5-P-0.95   Unit : mm

Weight: 0.014 g (typ.)

Package Dimensions

SSOP5-P-0.65A

Unit : mm
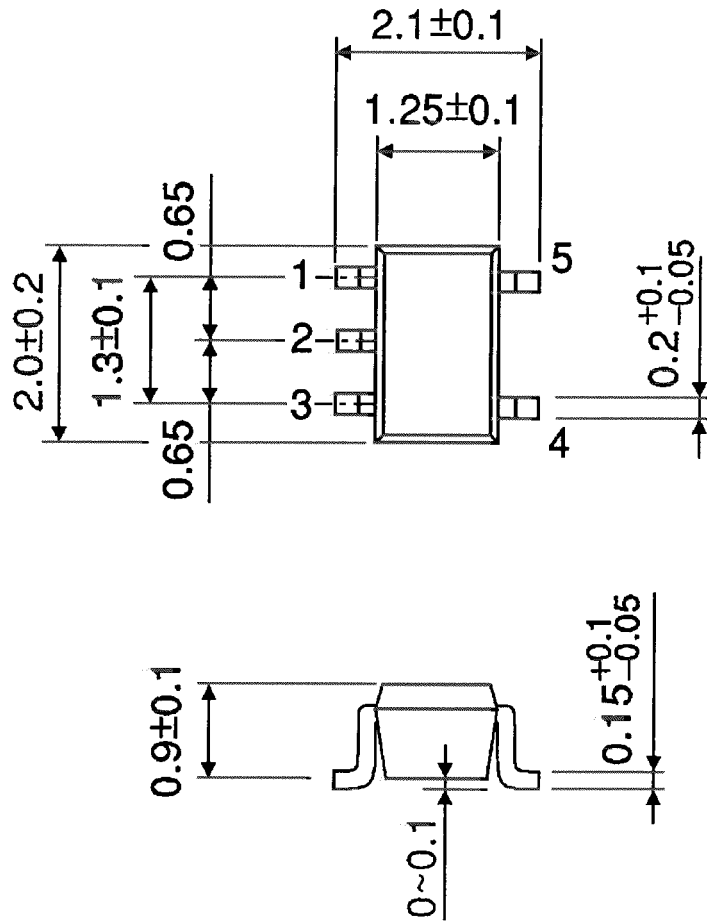
Weight: 0.006 g (typ.)

Package Dimensions

SON5-P-0.50

Unit : mm
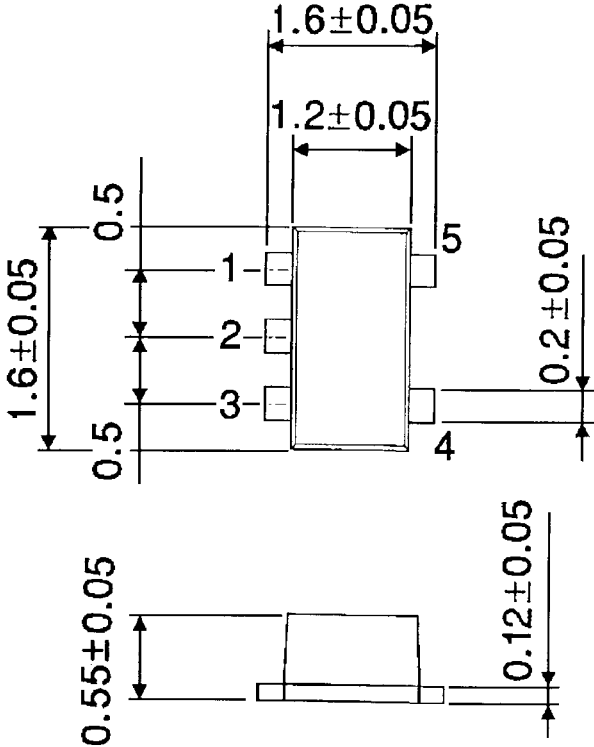
Weight: 0.003 g (typ.)

RESTRICTIONS ON PRODUCT USE