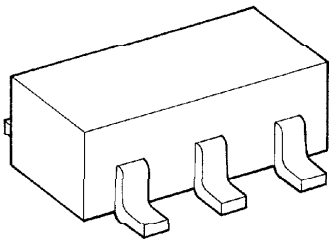
TOSHIBA CMOS LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC75S57F, TC75S57FU

## SINGLE COMPARATOR

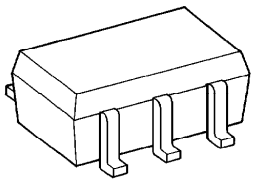
TC75S57F, TC75S57FU are CMOS type general-purpose single comparator capable of single power supply operation and using lower supply currents than the conventional bipolar comparators. Its push-pull output can connect directly to logical IC's such as TTL and CMOS circuits.

TC75S57F



SSOP5-P-0.95

TC75S57FU



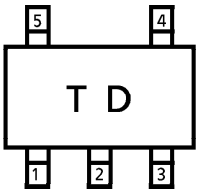
SSOP5-P-0.65A

Weight
SSOP5-P-0.95 : 0.014g (Typ.)
SSOP5-P-0.65A : 0.006g (Typ.)

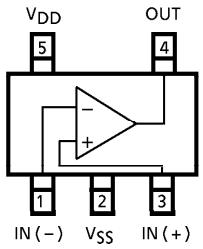
### FEATURES

- Low supply current : $I_{DD}$ = 100$\mu$A (Typ.)
- Single power supply operation
- Wide common mode input voltage range : $V_{SS}$~$V_{DD}$ − 0.9V
- Push-pull output circuit
- Low input bias current
- Small package

**MARKING** (TOP VIEW)




**PIN CONNECTION** (TOP VIEW)




961001EBA1

**MAXIMUM RATINGS** (Ta = 25°C)

| CHARACTERISTIC | 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 | $I_{OUT}$ | ±35 | mA |
| Power Dissipation | $P_D$ | 200 | mW |
| Operating Temperature | $T_{opr}$ | −40~85 | °C |
| Storage Temperature | $T_{stg}$ | −55~125 | °C |

(Note) Since this product sometimes brings about latchup, which is peculiar to CMOS devices, note the following points :

- Don't raise the voltage level of I/O pins beyond $V_{DD}$, nor lower it below $V_{SS}$. Consider the timing for power supply, too.
- Don't let any abnormal noise enter the device.

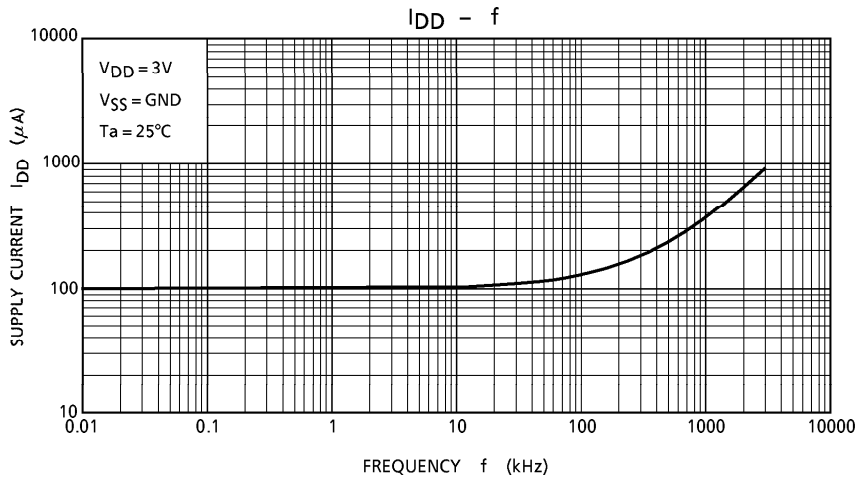
**ELECTRICAL CHARACTERISTICS** ($V_{DD}$ = 5V, $V_{SS}$ = GND, Ta = 25°C)

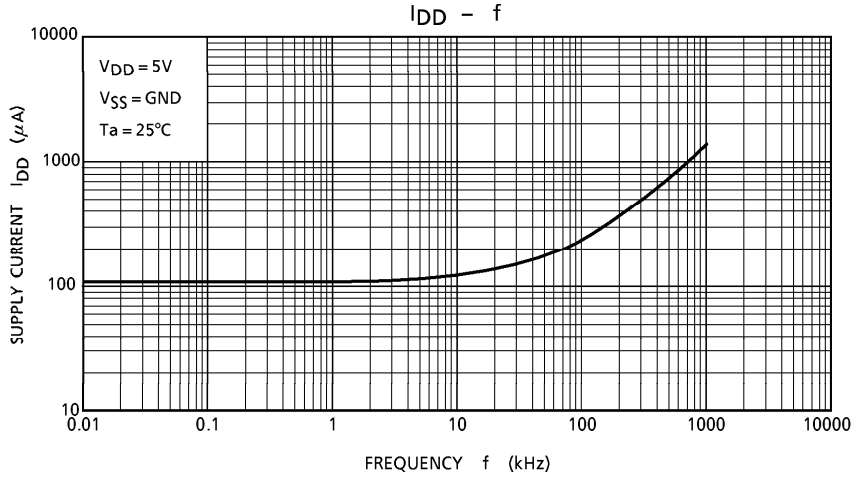
| CHARACTERISTIC | SYMBOL | TEST CIR-CUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Input Offset Voltage | $V_{IO}$ | — | — | — | ±1 | ±7 | mV |
| Input Offset Current | $I_{IO}$ | — | — | — | 1 | — | pA |
| Input Bias Current | $I_I$ | — | — | — | 1 | — | pA |
| 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 | $I_{sink}$ | — | $V_{OL}$ = 0.5V | 13 | 25 | — | mA |
| Source Current | $I_{source}$ | — | $V_{OH}$ = 4.5V | 9 | 21 | — | mA |
| Output Voltage | $V_{OL}$ | — | $I_{sink}$ = 5.0mA | — | 0.1 | 0.3 | V |
| | $V_{OH}$ | — | $I_{source}$ = 5.0mA | 4.7 | 4.9 | — | |
| Operating Supply Voltage | $V_{DD}$ | — | — | 1.8 | — | 7.0 | V |
| Propagation Delay Time (Turn ON) | $t_{PLH}$ (1) | — | Over drive = 100mV | — | 140 | — | ns |
| | $t_{PLH}$ (2) | — | TTL step input | — | 90 | — | |
| Propagation Delay Time (Turn OFF) | $t_{PHL}$ (1) | — | Over drive = 100mV | — | 90 | — | ns |
| | $t_{PHL}$ (2) | — | TTL step input | — | 70 | — | |
| Response Time | $t_{TLH}$ | — | Over drive = 100mV | — | 11 | — | ns |
| | $t_{THL}$ | — | Over drive = 100mV | — | 7 | — | |

**ELECTRICAL CHARACTERISTICS** ($V_{DD}$ = 3V, $V_{SS}$ = GND, Ta = 25°C)

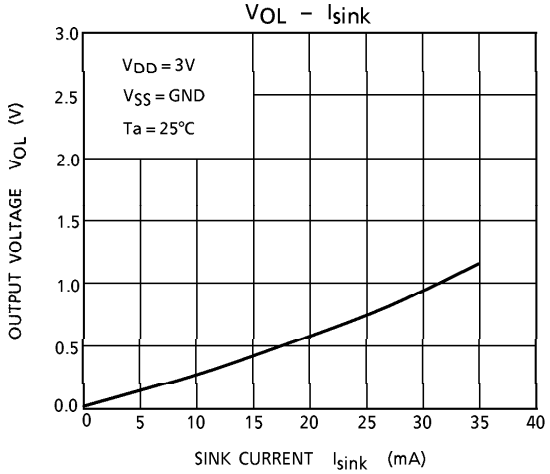
| CHARACTERISTIC | SYMBOL | TEST CIR-CUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Input Offset Voltage | $V_{IO}$ | — | — | — | ±1 | ±7 | mV |
| Input Offset Current | $I_{IO}$ | — | — | — | 1 | — | pA |
| Input Bias Current | $I_I$ | — | — | — | 1 | — | pA |
| Common Mode Input Voltage | $CMV_{IN}$ | — | — | 0 | — | 2.1 | V |
| Supply Current | $I_{DD}$ (Note) | — | — | — | 100 | 200 | μA |
| Sink Current | $I_{sink}$ | — | $V_{OL}$ = 0.5V | 6 | 18 | — | mA |
| Source Current | $I_{source}$ | — | $V_{OH}$ = 2.5V | 3 | 15 | — | mA |
| Output Voltage | $V_{OL}$ | — | $I_{sink}$ = 5.0mA | — | 0.15 | 0.35 | V |
| | $V_{OH}$ | — | $I_{source}$ = 5.0mA | 2.65 | 2.85 | — | |
| Propagation Delay Time (Turn ON) | $t_{PLH}$ | — | Over drive = 100mV | — | 110 | — | ns |
| Propagation Delay Time (Turn OFF) | $t_{PHL}$ | — | Over drive = 100mV | — | 90 | — | ns |
| Response Time | $t_{TLH}$ | — | Over drive = 100mV | — | 7 | — | ns |
| | $t_{THL}$ | — | Over drive = 100mV | — | 8 | — | |

(Note) Since this product causes an increase in current consumption with a rise in operational frequency, make sure that power consumption does not exceed the allowable dissipation.

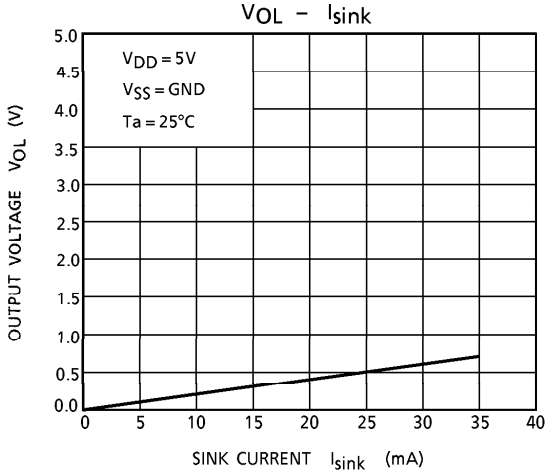

$I_{DD}$ – f
$V_{DD}$ = 3V
$V_{SS}$ = GND
Ta = 25°C
SUPPLY CURRENT $I_{DD}$ (μA)
10000
1000
100
10
0.01
0.1
1
10
100
1000
10000
FREQUENCY f (kHz)


$I_{DD}$ – f
$V_{DD}$ = 5V
$V_{SS}$ = GND
Ta = 25°C
SUPPLY CURRENT $I_{DD}$ (μA)
10000
1000
100
10
0.01
0.1
1
10
100
1000
10000
FREQUENCY f (kHz)

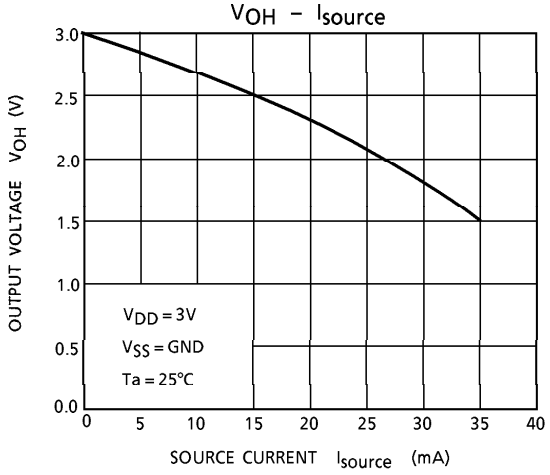
$V_{OL}$ – $I_{sink}$



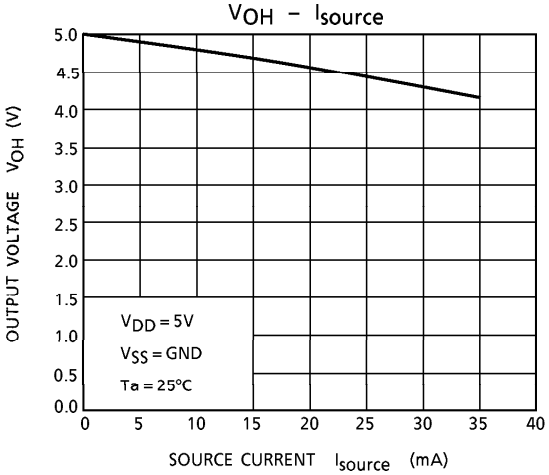

$V_{OL}$ – $I_{sink}$



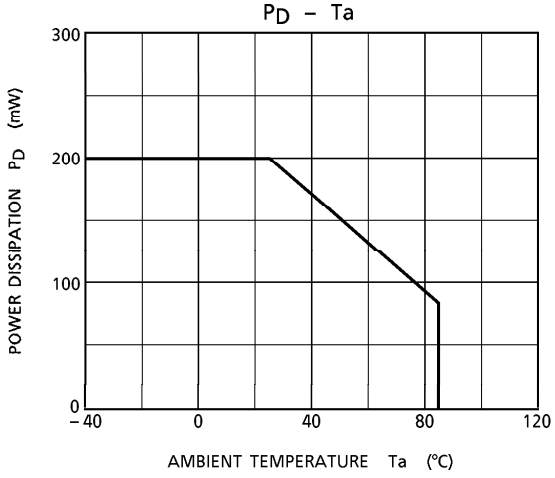

$V_{OH}$ – $I_{source}$




$V_{OH}$ – $I_{source}$



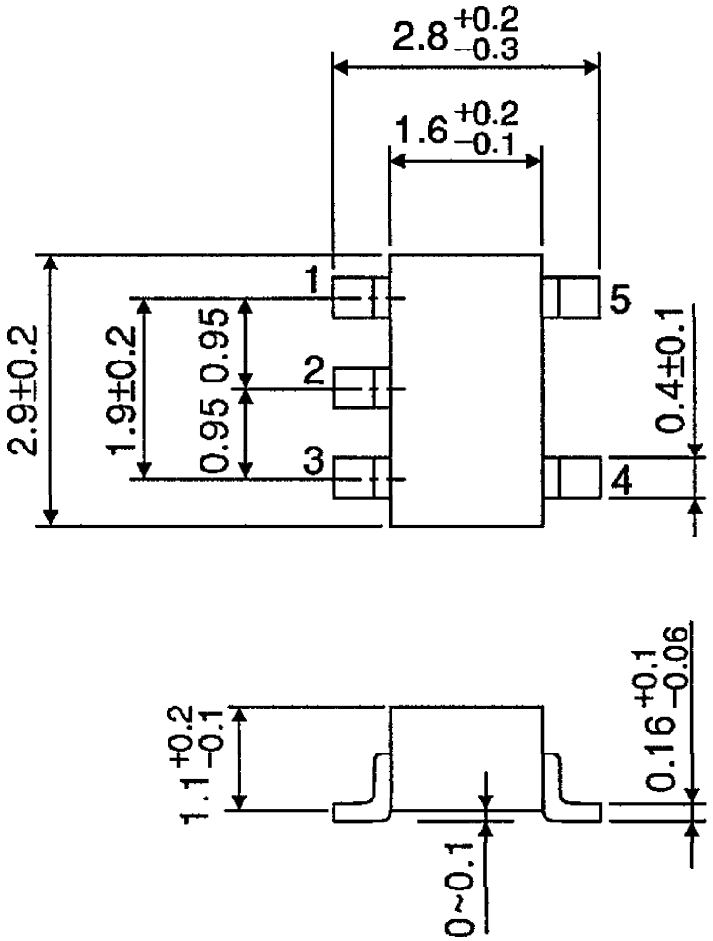

$P_D$ – Ta



**OUTLINE DRAWING**

SSOP5-P-0.95

Unit : mm

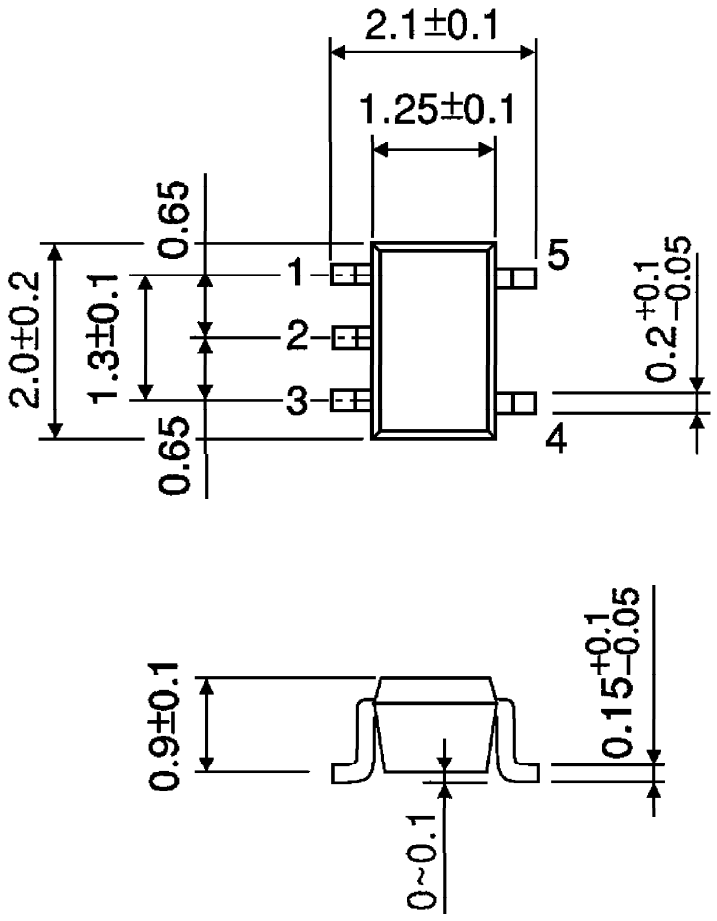



Weight : 0.014g (Typ.)

**OUTLINE DRAWING**

SSOP5-P-0.65A

Unit : mm




Weight : 0.006g (Typ.)