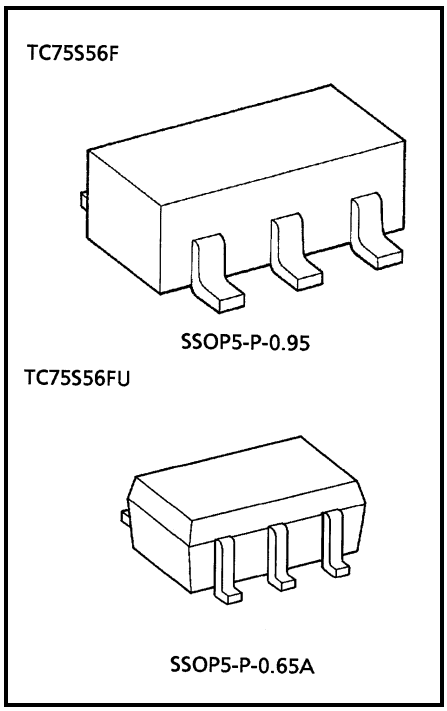
TOSHIBA CMOS Linear Integrated Circuit Silicon Monolithic

TC75S56F,TC75S56FU

Single Comparator

TC75S56F, TC75S56FU 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.

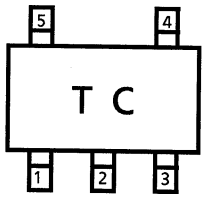


Weight
SSOP5-P-0.95 : 0.014g (Typ.)
SSOP5-P-0.65A : 0.006g (Typ.)

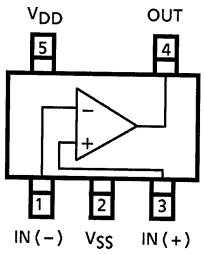
Features

- Low supply current : I_{DD} = 10μA (typ.)
- Single power supply operation
- Wide common mode input voltage range : V_{SS}~V_{DD}−0.9V
- Puch-pull output circuit
- Low input bias current
- Small package

Marking (Top View)



Pin Connection (Top View)



Maximum Ratings (Ta = 25°C)

Characterisstic	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 th following points:

- Don’t raise the voltage level of I/O pins beyond VDD, nor lower it below VSS. Consider the timing for power supply, too.
- Don’t let any abnormal noise enter the device.

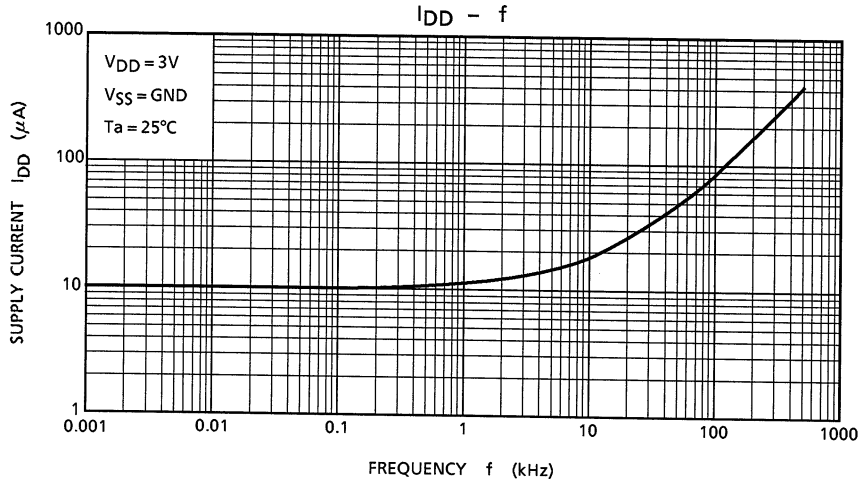
Electrical Characteristics (V_{DD} = 5V, V_{SS} = GND, Ta = 25°C)

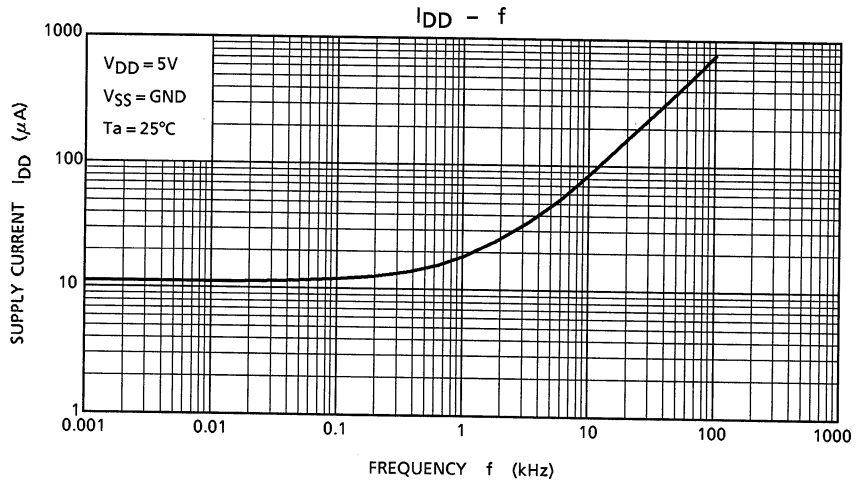
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input offset voltage	V_{IO}	—	—	—	±1	±7	mV
Input offset current	I_{IO}	—	—	—	1	—	pA
Input bias current	I_I	—	—	—	1	—	pA
Common mode input voltage	CMV_{IN}	—	—	0	—	4.1	V
Supply current	$I_{DD\ (Note)}$	—	—	—	11	22	μA
Voltage gain	G_V	—	—	—	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	—	680	—	ns
	$t_{PLH\ (2)}$		TTL step input	—	500	—	
Propagation delay time (turn off)	$t_{PHL\ (1)}$	—	Over drive = 100mV	—	250	—	ns
	$t_{PHL\ (2)}$		TTL step input	—	380	—	
Response time	t_{TLH}	—	Over drive = 100mV	—	60	—	ns
	t_{THL}	—	Over drive = 100mV	—	8	—	

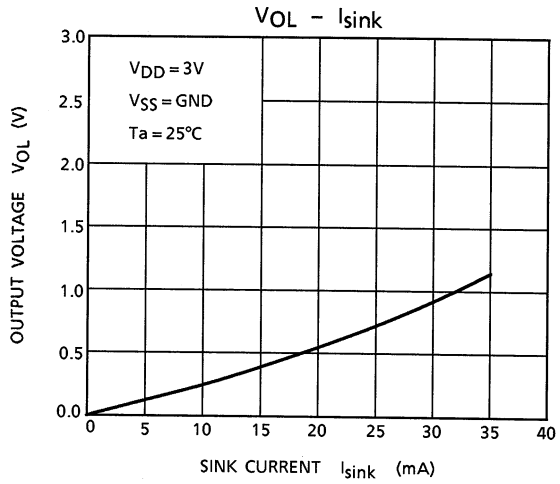
Electrical Characteristics (V_{DD} = 3V, V_{SS} = GND, Ta = 25°C)

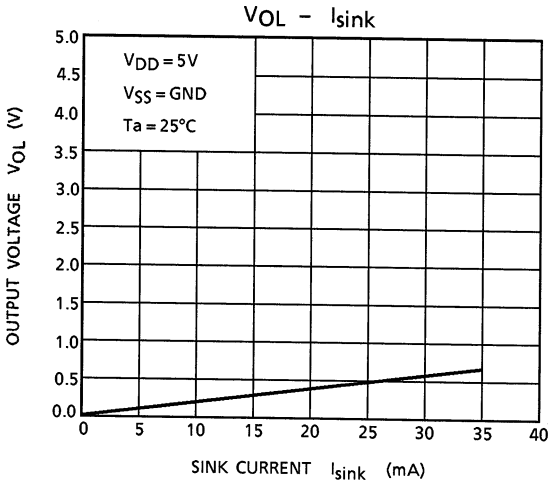
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input offset voltage	V_{IO}	—	—	—	±1	±7	mV
Input offset current	I_{IO}	—	—	—	1	—	pA
Input bias current	I_I	—	—	—	1	—	pA
Common mode input voltage	CMV_{IN}	—	—	0	—	2.1	V
Supply current	$I_{DD\ (Note)}$	—	—	—	10	20	μA
Sink current	I_{sink}	—	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	—	550	—	ns
Propagation delay time (turn off)	t_{PHL}	—	Over drive = 100mV	—	250	—	ns
Response time	t_{TLH}	—	Over drive = 100mV	—	30	—	ns
	t_{THL}	—	Over drive = 100mV	—	8	—	

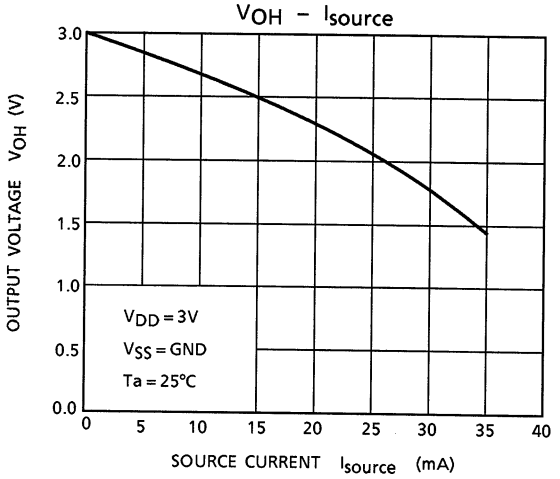
Note: Since this product causes an increase in current consumption with a rise in operational frequency, make sure that power consumption does not exceed the allowable dissipation.

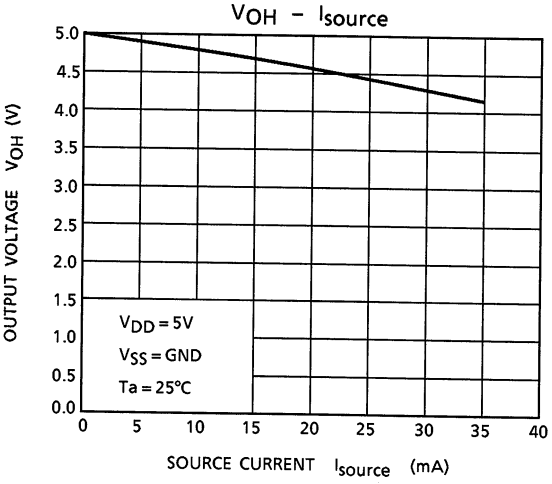

I_{DD} – f
V_{DD} = 3V
V_{SS} = GND
Ta = 25°C
SUPPLY CURRENT I_{DD} (μA)
1000
100
10
1
0.001
0.01
0.1
1
10
100
1000
FREQUENCY f (kHz)

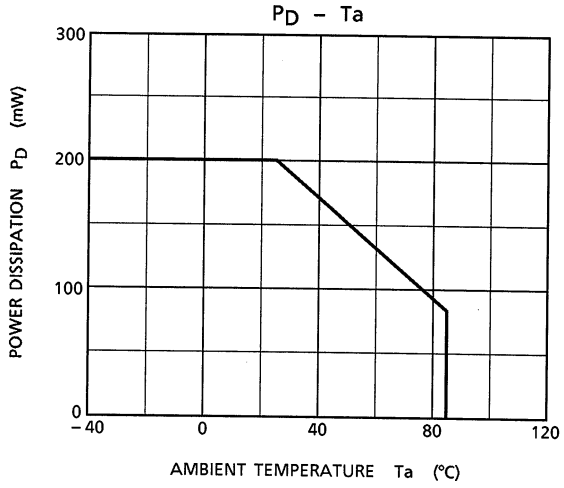

I_{DD} – f
V_{DD} = 5V
V_{SS} = GND
Ta = 25°C
SUPPLY CURRENT I_{DD} (μA)
1000
100
10
1
0.001
0.01
0.1
1
10
100
1000
FREQUENCY f (kHz)


V_{OL} – I_{sink}
V_{DD} = 3V
V_{SS} = GND
Ta = 25°C
OUTPUT VOLTAGE V_{OL} (V)
SINK CURRENT I_{sink} (mA)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
5
10
15
20
25
30
35
40


V_{OL} – I_{sink}
V_{DD} = 5V
V_{SS} = GND
Ta = 25°C
OUTPUT VOLTAGE V_{OL} (V)
SINK CURRENT I_{sink} (mA)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
0
5
10
15
20
25
30
35
40

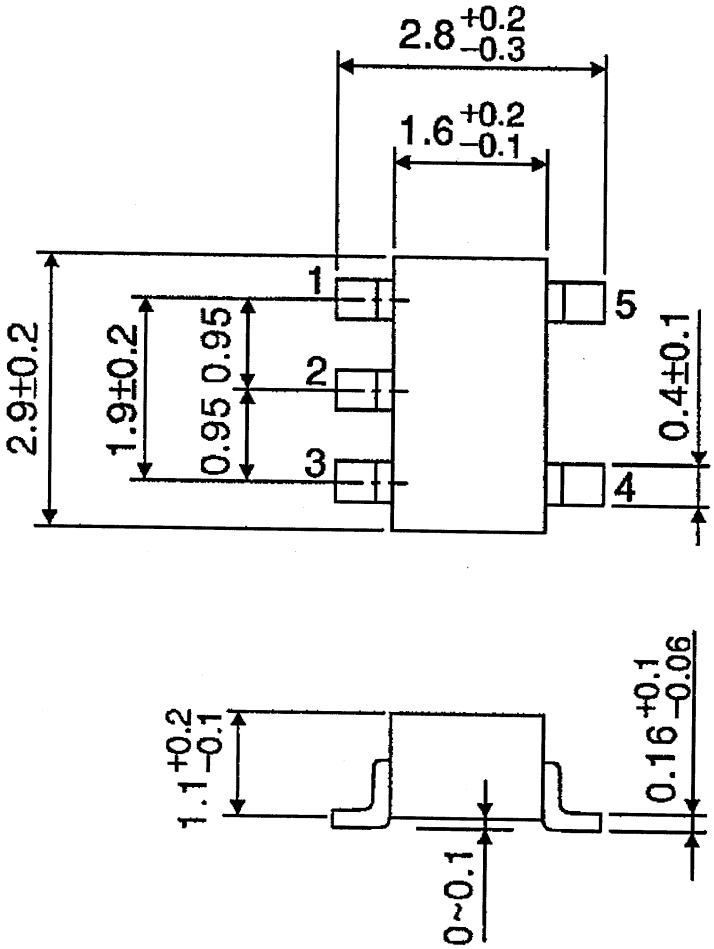

V_{OH} – I_{source}
V_{DD} = 3V
V_{SS} = GND
Ta = 25°C
OUTPUT VOLTAGE V_{OH} (V)
SOURCE CURRENT I_{source} (mA)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
5
10
15
20
25
30
35
40


V_{OH} – I_{source}
V_{DD} = 5V
V_{SS} = GND
Ta = 25°C
OUTPUT VOLTAGE V_{OH} (V)
SOURCE CURRENT I_{source} (mA)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
0
5
10
15
20
25
30
35
40


P_D – Ta
POWER DISSIPATION P_D (mW)
AMBIENT TEMPERATURE Ta (°C)
0
100
200
300
–40
0
40
80
120

Package Dimensions

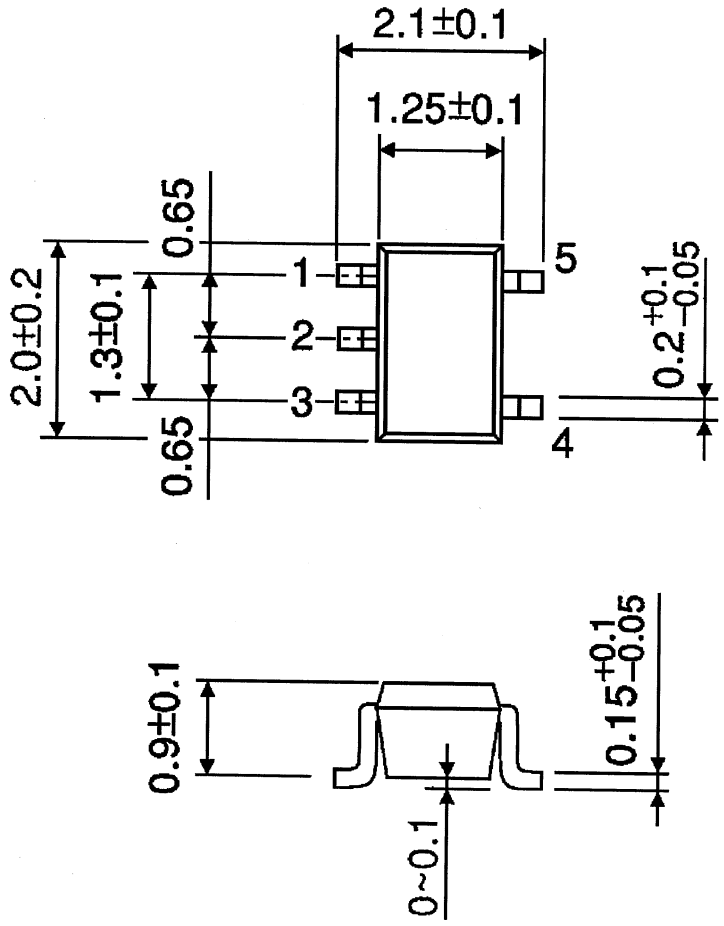
SSOP5-P-0.95 Unit: mm



Weight: 0.014g (typ.)

Package Dimensions

SSOP5-P-0.65A Unit: mm



Weight: 0.006g (typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer’s own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.