TOSHIBA CMOS Linear Integrated Circuit Silicon Monolithic

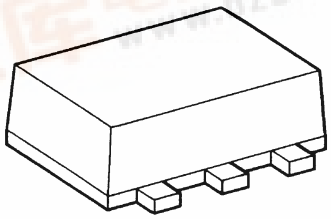
TC75S59AFE,TC75S59AFC

Single Comparator（Open-Drain Output）

The TC75S59AFE and TC75S59AFC are CMOS general-purpose single comparators. The devices can operate from a single supply voltage and are designed for a lower supply-current than conventional general-purpose bipolar comparators. The output is designed for Open-Drain Output and can supply a higher voltage than the power supply. Therefore, it is possible to pull-up the voltage to a level higher than that of the power supply. The Open-Drain Output can be wired-OR with another Open-Drain Output circuit.

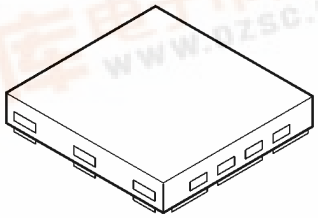
* Output voltage should not exceed the maximum rating.

TC75S59AFE



SON5-P-0.50

TC75S59AFC



CSON6-P-0.45

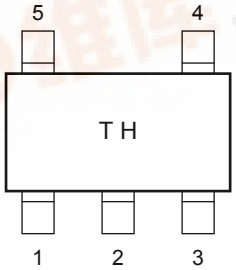
Weight
SON5-P-0.50 : 0.003 g (typ.)
CSON6-P-0.45 : 0.002 g (typ.)

Features

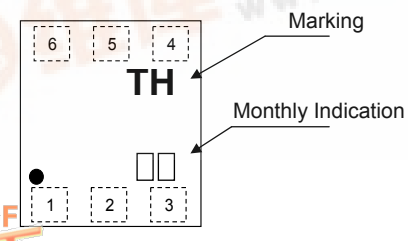
- Low Supply Current: I_{DD} = 100 μA (typ.)
- Single Power Supply Operation
- Wide Common Mode Input Voltage Range: V_{SS}~V_{DD} − 0.9 V
- Open-Drain Output Circuit
- Low Input Bias Current
- Small Package

Marking (top view)

TC75S59AFE

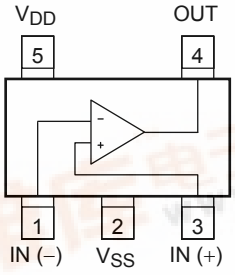


TC75S59AFC

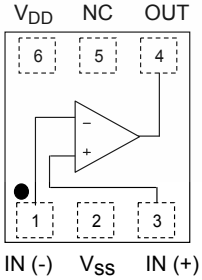


Pin Assignment (top view)

TC75S59AFE



TC75S59AFC



Absolute 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
Output Voltage	V_O	V_{SS} ~ V_{SS} + 7		V
Power Dissipation	P_D	TC75S59AFE	100	mW
		TC75S59AFC	100 (Note 1)	
Operating Temperature	T_{opr}	−40~85		°C
Strage Temperature	T_{stg}	−55~125		°C

Note: Due to the CMOS structure, this device may be susceptible to latch-up. To prevent latch-up, please take the following precautions;

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

(Note 1) : FR4 in board implementation
(25.4mm × 25.4mm × 1.6t, Cu Pad: 0.4mm^2)

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

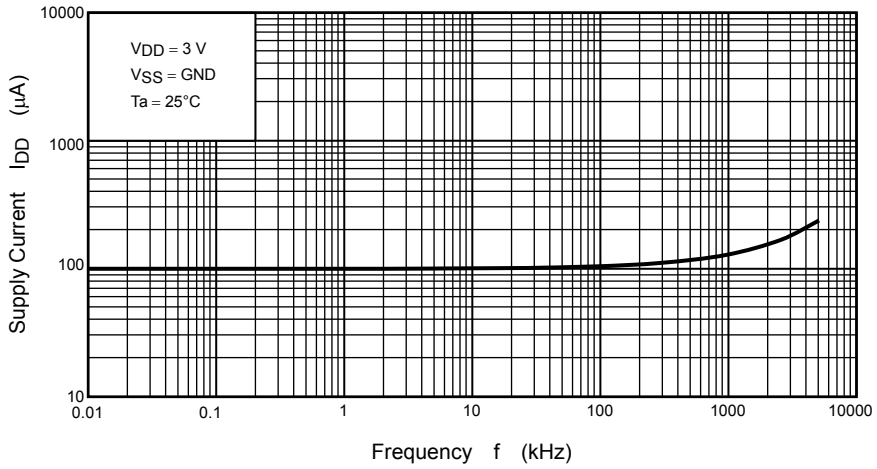
Characteristics	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Input Offset Voltage	V_{IO}	—	—	—	±1	±7	mV
Input Offset Current	I_{IO}	—	—	—	1	—	pA
Input Bias Current	I_I	—	—	—	1	—	pA
Common Mode Input Voltage	CMV_{IN}	—	—	0	—	4.1	V
Supply Current	I_{DD} (Note1)	—	—	—	110	220	μA
Voltage Gain	G_V	—	—	—	94	—	dB
Sink Current	I_{sink}	—	V_{OL} = 0.5 V	13	25	—	mA
Output Leakage Current	I_{LEAK}	—	V_{DD} = 5 V , V_O = 5 V	—	5	—	nA
Off-state Leakage Current	I_{OFF}	—	V_{DD} = 0 V , V_O = 5 V	—	5	—	nA
Output Low Voltage	V_{OL}	—	I_{sink} = 5.0 mA	—	0.1	0.3	V
Operating Supply Voltage Range	V_{DD}	—	—	1.8	—	7.0	V
Propagation Delay (Turn on)	$t_{PLH\ (1)}$	—	Over Drive = 100 mV	—	200	—	ns
	$t_{PLH\ (2)}$	—	TTLStep Input	—	140	—	
Propagation Delay (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)

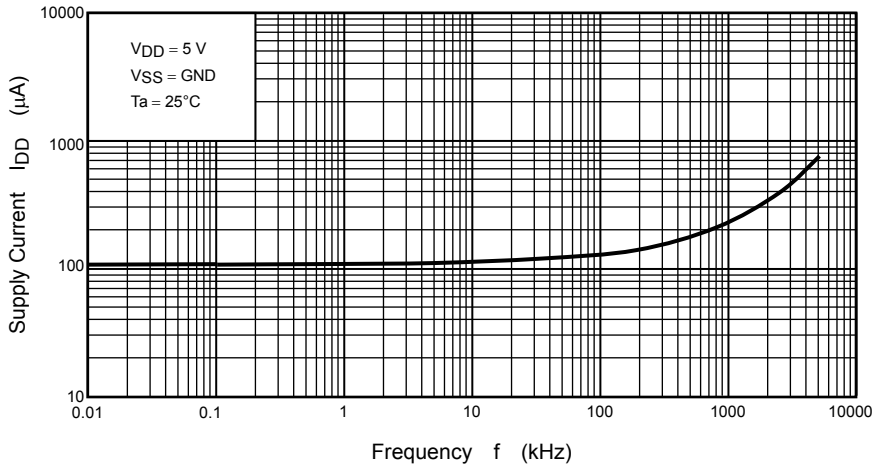
Characteristics	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Input Offset Voltage	V_{IO}	—	—	—	±1	±7	mV
Input Offset Current	I_{IO}	—	—	—	1	—	pA
Input Bias Current	I_I	—	—	—	1	—	pA
Common Mode Input Voltage	CMV_{IN}	—	—	0	—	2.1	V
Supply Current	I_{DD} (Note1)	—	—	—	100	200	μA
Sink Current	I_{sink}	—	V_{OL} = 0.5 V	6	18	—	mA
Output Leakage Current	I_{LEAK}	—	V_{DD} = 3 V , V_O = 3 V	—	5	—	nA
Off-State Leakage Current	I_{OFF}	—	V_{DD} = 0 V , V_O = 3 V	—	5	—	nA
Output Low Voltage	V_{OL}	—	I_{sink} = 5.0 mA	—	0.15	0.35	V
Propagation Delay (Turn On)	t_{PLH}	—	Over Drive = 100 mV	—	160	—	ns
Propagation Delay (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	—	

Note1: The current consumption of this device increases as its operating frequency increases. Note that the power dissipation should not exceed the allowable power.

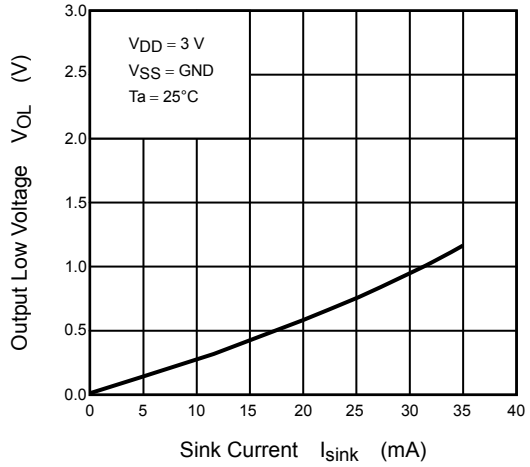
I_{DD} – f


10000
1000
100
10
0.01
0.1
1
10
100
1000
10000
VDD = 3 V
VSS = GND
Ta = 25°C
Supply Current IDD (μA)
Frequency f (kHz)

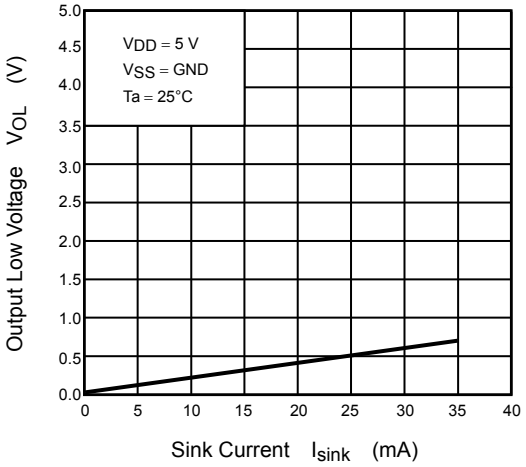
I_{DD} – f


10000
1000
100
10
0.01
0.1
1
10
100
1000
10000
VDD = 5 V
VSS = GND
Ta = 25°C
Supply Current IDD (μA)
Frequency f (kHz)

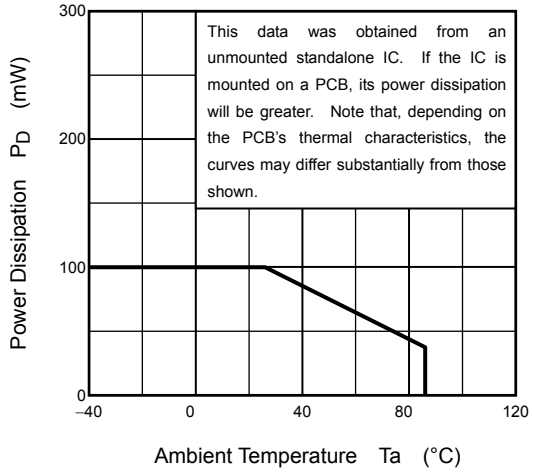
$V_{OL} – I_{sink}$



$V_{OL} – I_{sink}$

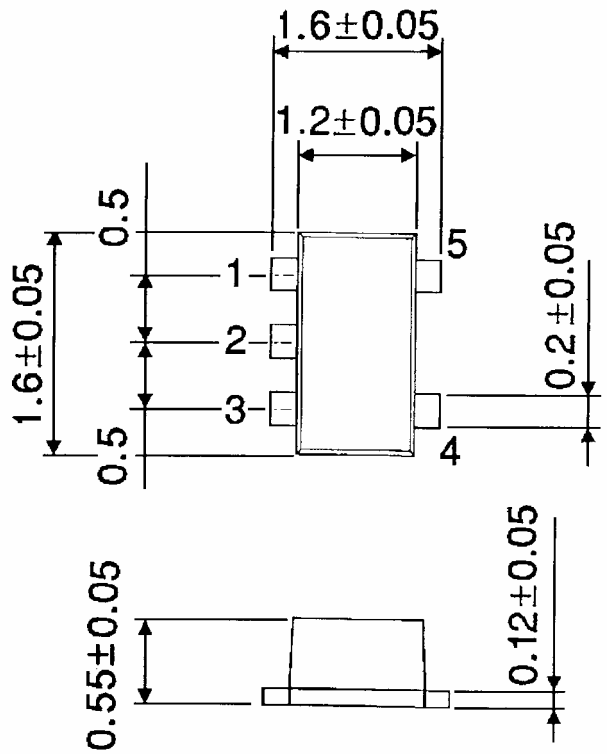


$P_D – Ta$



Package Dimensions

SON5-P-0.50 Unit : mm

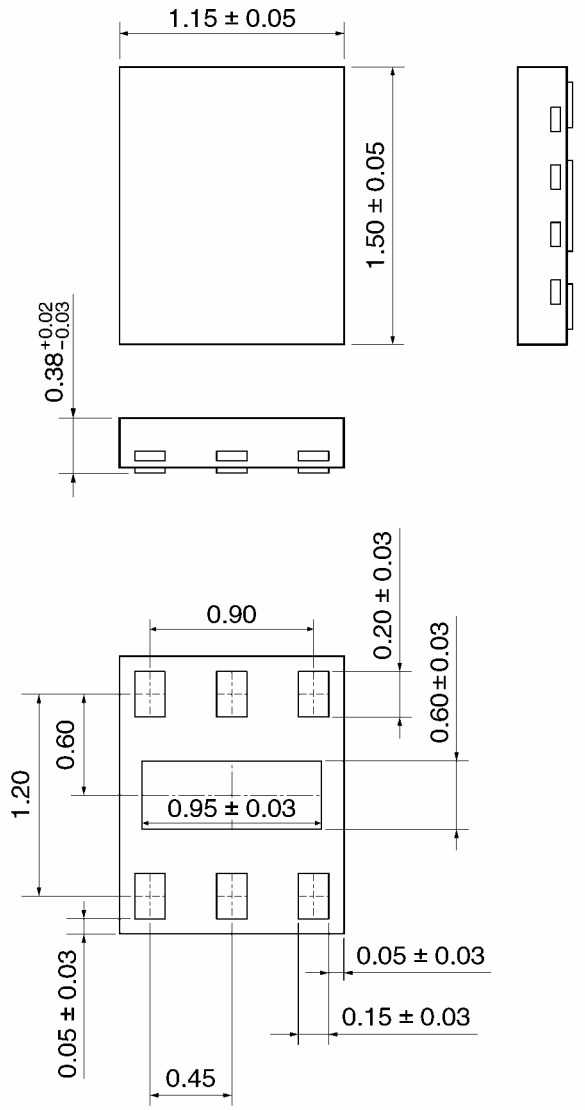


Weight: 0.003 g (Typ.)

Package Dimensions

CSON6-P-0.45

Unit: mm



Weight: 0.002 g (Typ.)

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