M52670

4BIT A/D CONVERTER

DESCRIPTION

The M52670P and M52670FP are monolithic integrated circuits designed for 4bit analog to digital (A/D) converter, especially for the use of high speed signal converting system. It is capable of high speed signal convertion because of its paralel comparating circuits system. This device is consisted of high speed comparators (16 elements), gray-code converter, ECL-to-TTL converter, latching circuits, gray-to-binary code converter, and under-flow output switching circuits.

FEATURES

- Capable of high speed sampling rate
  ..... (max.) 10M sample/sec
- High resolution in analog to digital convertion
  ..... (max.) ILSB
- T.T.L compatible output (open collectored output)
- Easy to expand to 5bit A/D converter by parallel combination of these two ICs.
- Built-in high speed comparator composed of ECL type circuit.

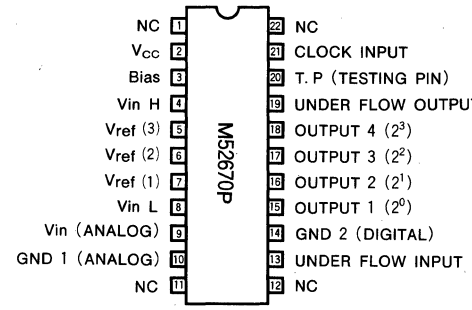
APPLICATIONS

- High speed data converting system
- Interface circuits for video equipments

RECOMMENDED OPERATING CONDITIONS

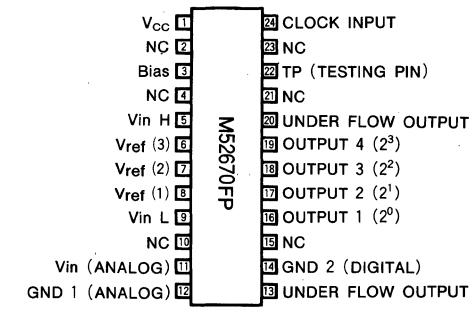
Supply voltage range ..... 4.5V~7V
Rated supply voltage ..... 5V±10%

PIN CONFIGURATION (TOP VIEW)

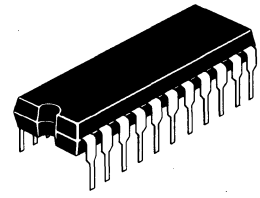


Outline 22P4 NC : NO CONNECTION

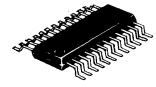
PIN CONFIGURATION (TOP VIEW)



Outline 24P2-C NC : NO CONNECTION



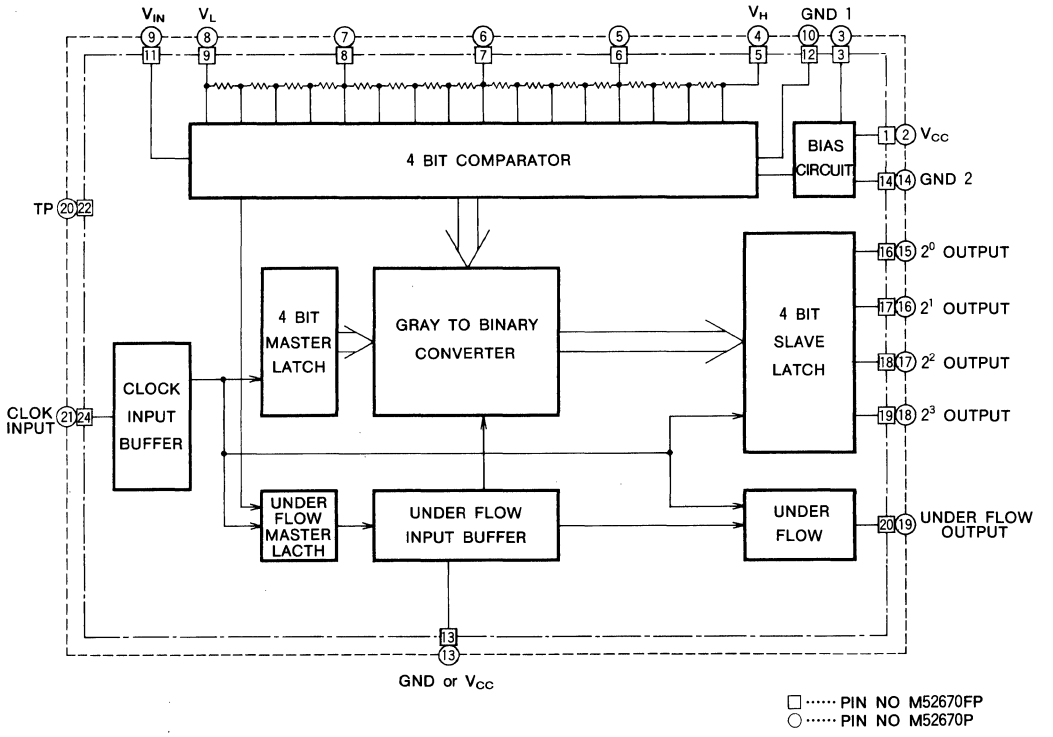
22-pin molded plastic DIL



24-pin molded plastic FLAT

MITSUBISHI ELECTRIC

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_a=25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Limits	Unit
V_{CC}	Supply voltage		7	V
V_{IN}	Input voltage	Pin⑬, ㉔-GND····M52670FP Pin⑬, ㉑-GND····M52670P	7	V
BV_O	Output voltage		15	V
P_d	Power dissipation		(M52670FP) 550 (M52670P) 800	mW
T_{opr}	Operating temparature		−10～+75	℃
T_{stg}	Storage temparature		−40～+125	℃

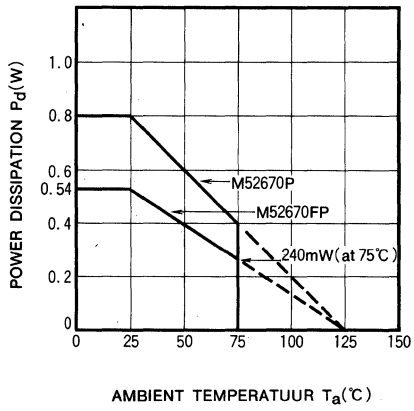
ELECTRIC CHARACTERISTICS (T_a=25℃, V_{CC}=5V, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{CC}	Supply voltage		4.5	5.0	6.5	V
I_{CC}	Circuit current	V_{CC}=5.0V, Clock 10MHz		33	48	mA
f_{SC}	Maximum sampling freguency	V_{CC}=5.0V, Duty 50%	10			MHz
$V_{IN⑧⑨}$	Pin⑧⑨ input voltage		1.1			V
$V_{IN④⑤}$	Pin④⑤ input voltage				V_{CC}−0.7	V
$\Delta V_{⑧⑨-④⑤}$	Pin⑧⑨-④⑤ input voltage		1.0			V
$V_{th⑬⑬}$	Pin⑬⑬ threshold voltage		0.6	0.9	2.0	V
$V_{th㉑㉔}$	Pin㉑㉔ threshold voltage		0.6	0.9	2.0	V
$I_{IN⑬⑬}$	Pin⑬⑬ input current	V_{CC}=5.25V, $V_{IN⑬⑬}$=2.7V			20	μA
$I_{IN㉑㉔}$	Pin㉑㉔ input current	V_{CC}=5.25V, $V_{IN㉑⑬}$=2.7V			20	μA
$V_{OL⑮⑯-⑲⑳}$	Pin⑮⑯-⑲⑳ output voltage	V_{CC}=4.75V, I_{OL}=8.0mA			0.5	V

○……PIN NO M52670P
□……PIN NO M52670FP

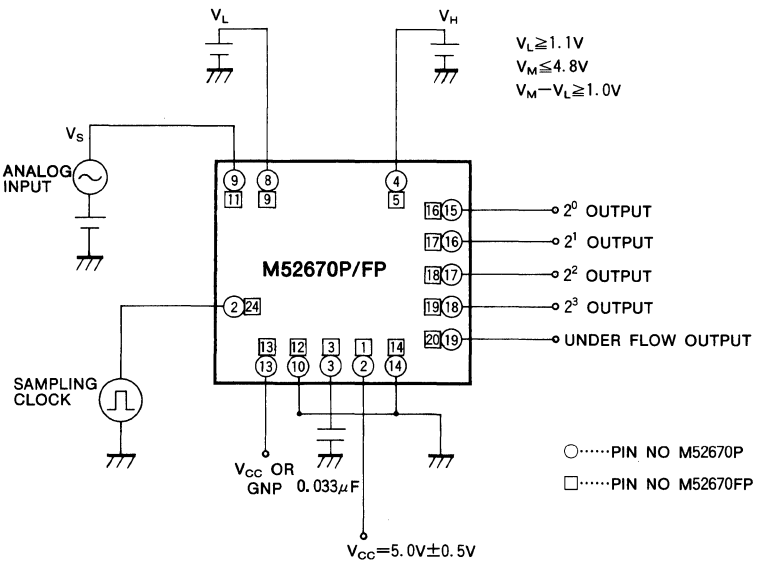
TYPICAL CHARACTERISTICS

THERMAL DERATING
(MAXIMUM RATING)



APPLICATION EXAMPLES

(1) 4bits A/D converter



A) OUTPUT LEVEL VS INPUT LEVEL

(in the case of 13 Pin GND)

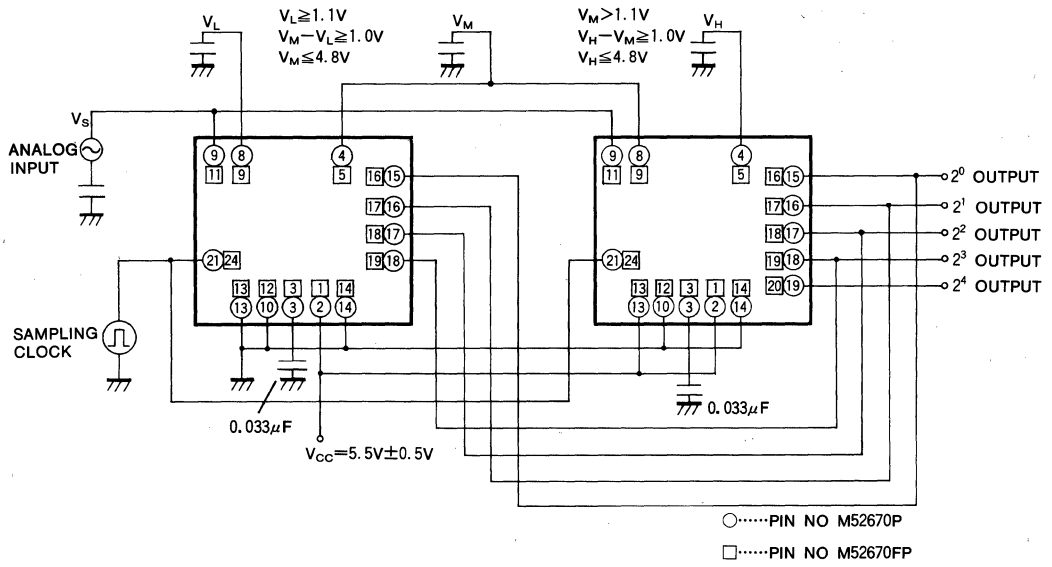
Output		Low								V_S	→							High	
M52670FP	M52670P	V_0	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	V_9	V_{10}	V_{11}	V_{12}	V_{13}	V_{14}	V_{15}		
16 Pin	15 Pin	L	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	
17 Pin	16 Pin	L	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H	
18 Pin	17 Pin	L	L	L	L	L	H	H	H	H	L	L	L	L	H	H	H	H	
19 Pin	18 Pin	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	
20 Pin	19 Pin	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	

B) OUTPUT LEVEL VS INPUT LEVEL

(in the case of 13 Pin V_{CC})

Output		Low								V_S	→							High	
M52670FP	M52670P	V_0	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	V_9	V_{10}	V_{11}	V_{12}	V_{13}	V_{14}	V_{15}		
16 Pin	15 Pin	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	
17 Pin	16 Pin	H	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H	
18 Pin	17 Pin	H	L	L	L	L	H	H	H	H	L	L	L	L	H	H	H	H	
19 Pin	18 Pin	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	
20 Pin	19 Pin	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	

(2) Example of 5bits A/D converter using two M52670P/FP



A OUTPUT LEVEL VS INPUT LEVEL

Output	V_S																															
	V_L																V_M															
	V_0	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	V_9	V_{10}	V_{11}	V_{12}	V_{13}	V_{14}	V_{15}	V_0	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	V_9	V_{10}	V_{11}	V_{12}	V_{13}	V_{14}	V_{15}
2^0	L	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H
2^1	L	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H
2^2	L	L	L	L	L	H	H	H	H	L	L	L	L	H	H	H	H	L	L	L	L	H	H	H	H	L	L	L	L	H	H	H	H
2^3	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H
2^4	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H