RICOH

RF/RP5H01

CMOS 64 bit PROM

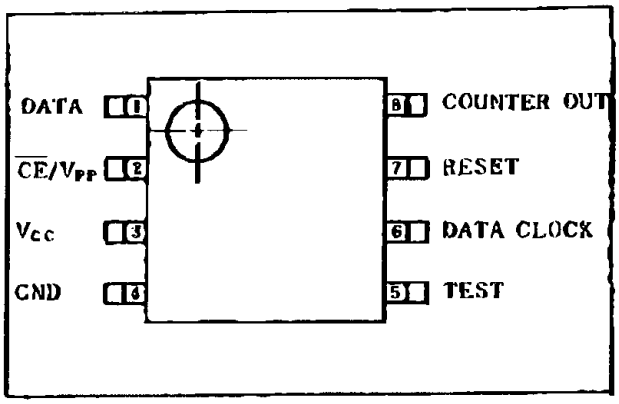
■ GENERAL DESCRIPTION

RF5H01/RP5H01 is a PROM with 64 × 1bit organization (+ dummy 8 bits), employing 2-layer silicon gate CMOS processing technology.

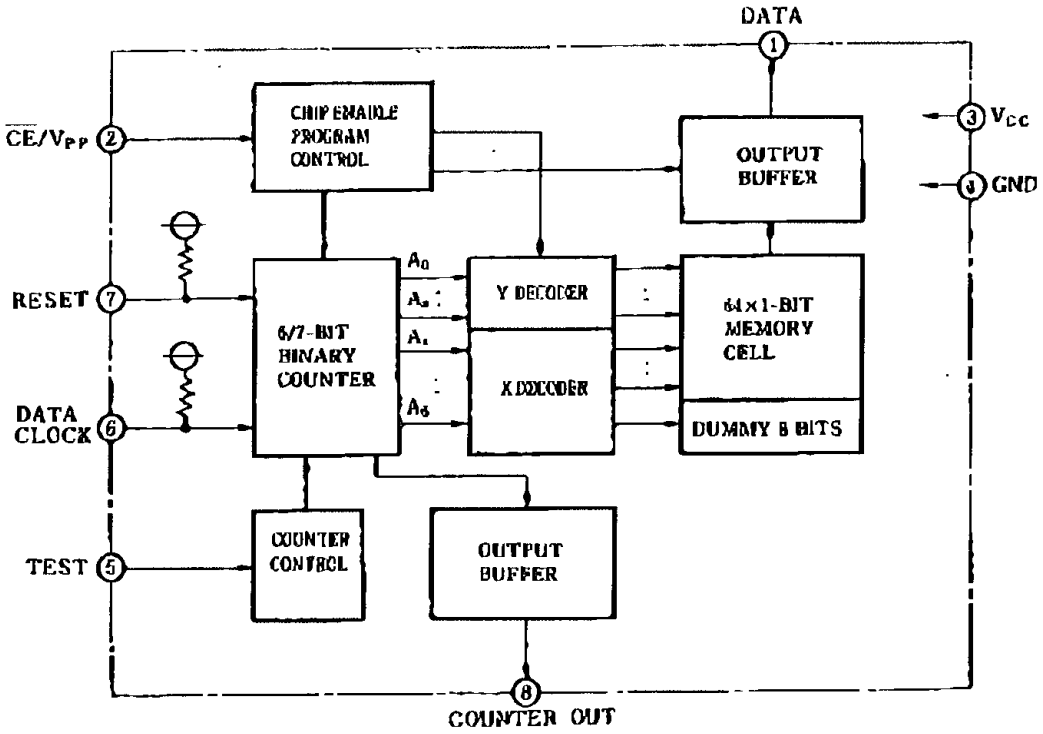
■ FEATURES

- 64 × 1bit organization (+ dummy 8 bits)
- Low power dissipation
  - Active 55mW (max)
  - Standby 550μW (max)
- Access time 1μs (max)
- Single power supply 5V±10%
- Serial outputs
- Inputs and outputs TTL level
- 3-state (Tri-state) outputs

■ PIN CONFIGURATION (Top view)



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

Symbol	Parameters	Conditions	Limits	Unit
V_{CC}	V_{CC} Supply Voltage	With respect to GND	−0.3~7	V
V_{PP}	V_{PP} Supply Voltage		−0.3~22	V
V_I	Input Voltage		−0.3~7	V
V_O	Output Voltage		−0.3~7	V
P_d	Maximum Power Dissipation	Ta=25℃	0.3	W
T_{opr}	Operating Temperature Range		−20~70	℃
T_{stg}	Storage Temperature		−40~125	℃

■ RECOMMENDED OPERATING CONDITIONS (Ta=−20~70℃)

Symbol	Parameters	Limits			Unit
		Min	Typ	Max	
V_{CC}	Supply Voltage	4.5	5.0	5.5	V
V_{IH}	Input High Voltage	2.0		V_{CC}+0.3	V
V_{IL}	Input Low Voltage	−0.1		0.8	V

■ ELECTRICAL CHARACTERISTICS

● READ OPERATION D.C. CHARACTERISTICS (Ta=−20~70℃, V_{CC}=5V±10%)

Symbol	Parameters		Test Conditions	Limits			Unit
				Min	Typ	Max	
I_{CC1}	Standby V_{CC} Supply Current		$\overline{CE}/V_{PP}=V_{CC}\pm0.3V$ DATA CLOCK,RESET=V_{CC} or Open TEST=GND or $V_{CC}\pm0.3V$			100	μA
I_{CC2}	Operating V_{CC} Supply Current		I_{OUT}=0mA			10	mA
V_{OH}	Output High Voltage		$I_{OH}=-400\mu A$	2.4			V
V_{OL}	Output Low Voltage		I_{OL}=2.1mA			0.45	V
V_{IH}	Input High Voltage	Except TEST		2.0		V_{CC}+0.3	V
		TEST		4.0		V_{CC}+0.3	V
V_{IL}	Input Low Voltage	Except TEST		−0.1		0.8	V
		TEST		−0.1		1.0	V
I_{LI}	Input Leakage Current	RESET,DATA CLOCK	V_I=0V,V_{CC}=5.5V	−180		−20	μA
		TEST,$\overline{CE}/V_{PP}$	V_I=0V~V_{CC}	−10		10	μA
I_{LO}	Output Leakage Current		V_O=0V~V_{CC}	−10		10	μA

● READ OPERATION, A.C. CHARACTERISTICS (Ta=−20~70℃, V_{CC}=5V±10%)

Symbol	Parameters	Test Conditions		Limits			Unit
				Min	Typ	Max	
t_{ACC}	Clock to Output Delay	$\overline{CE}/V_{PP}=V_{IL}$	Load= 1TTL+100pF			1	μs
t_{CE}	$\overline{CE}$ to Output Delay					1	μs
t_{DF}	$\overline{CE}$ High to Output Float			0		200	ns
t_{RW}	Reset pulse width			2			μs
t_{CW}	Clock pulse width			2			μs

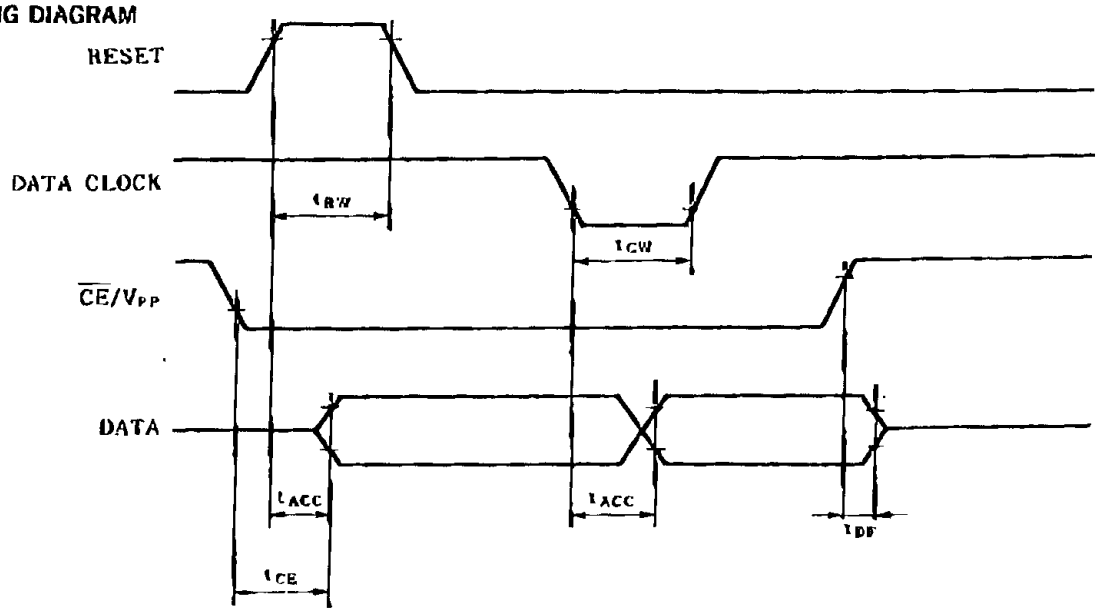
● D.C. PROGRAMMING CHARACTERISTICS ($Ta=25℃\pm5℃$, $V_{CC}=5V\pm5\%$)

Symbol	Parameters		Test Conditions	Limits			Unit
				Min	Typ	Max	
I_{PP}	V_{PP} Supply Current		$\overline{CE}/V_{PP}=V_{IHP}$			5	mA
I_{CC}	V_{CC} Supply Current					0.5	mA
V_{IH}	Input High Voltage	Except TEST		2.0		$V_{CC}+0.3$	V
		TEST		4.0		$V_{CC}+0.3$	V
V_{IL}	Input Low Voltage	Except TEST		−0.1		0.8	V
		TEST		−0.1		1.0	V
V_{IHP}	Program pulse Input High Voltage			20.5	21.0	21.5	V
V_{ILP}	Program pulse Input Low Voltage			2.0	V_{CC}	6.0	V
I_{LI}	Input leakage Current	RESET,DATA CLOCK	$V_I=0V$, $V_{CC}=5.25V$	−170		−20	μA
		TEST	$V_I=0V\sim V_{CC}$	−10		10	μA

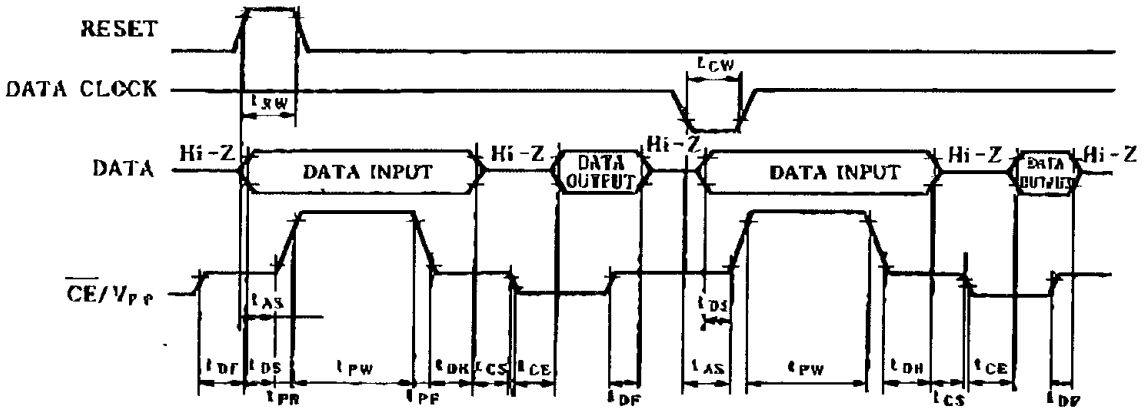
● PROGRAMMING CHARACTERISTICS ($Ta=25℃\pm5℃$, $V_{CC}=5V\pm5\%$)

Symbol	Parameters	Limits			Unit
		Min	Typ	Max	
t_{AS}	Address Set-up Time	2			μs
t_{CS}	$\overline{CE}$ Set-up Time	2			μs
t_{DS}	Data Set-up Time	2			μs
t_{DH}	Data Hold Time	2			μs
t_{DF}	$\overline{CE}$ to Output Float	0		200	ns
t_{CE}	$\overline{CE}$ to Output Delay			1	μs
t_{PW}	Program pulse width	45	50	55	ms
t_{PR}	V_{PP} Pulse rise time	0.5		100	μs
t_{PF}	V_{PP} Pulse fall time	0.5		100	μs
t_{RW}	Reset pulse width	2			μs
t_{CW}	Clock pulse width	2			μs

■ TIMING DIAGRAM



● PROGRAM MODE



■ OPERATING MODES

Pins / Mode	Data 1	Counter output 8	$\overline{CE}/V_{PP}$ 2	V_{CC} 3	GND 4
Read	Data Output	Clock(A5)Output	V_{IL}	V_{CC}	GND
Standby	High impedance	High impedance	V_{IH}	V_{CC}	GND
Program	Data Input	High impedance	V_{IHP}	V_{CC}	GND

	Counter operation mode
TEST (5) = GND	6 bits
TEST (5) = V_{CC}	7 bits

■ EXPLANATION ON OPERATION

● READ MODE

RF5H01/RP5H01 is a serial address type PROM with 6-bit/7-bit counter. The first bit can be read out by adding reset pulse after $\overline{CE}/V_{PP} = V_{IL}$. The 2nd bit – the 64th bit can be sequencially read out by adding data clock pulse. The output data is valid after a delay of t_{ACC} from reset rise up or data clock fall down, in the state of $\overline{CE}/V_{PP} = V_{IL}$.

In the state of TEST=GND, the counter operates as a 6-bit counter. It returns to the reset condition (address 000000), if it is added with 64-time data clock pulses after the reset pulse is applied.

The counter output pin is for operation test of the built-in counter. It puts out the highest output (A5) of the 6-bit counter.

● STANDBY MODE

RF5H01/RP5H01 is provided with power down function that is controlled by $\overline{CE}$ input. If TTL high level is given to the chip enable input ($\overline{CE}$), the device comes to be the Standby Mode, and the output is in the state of high impedance.

● PROGRAM MODE

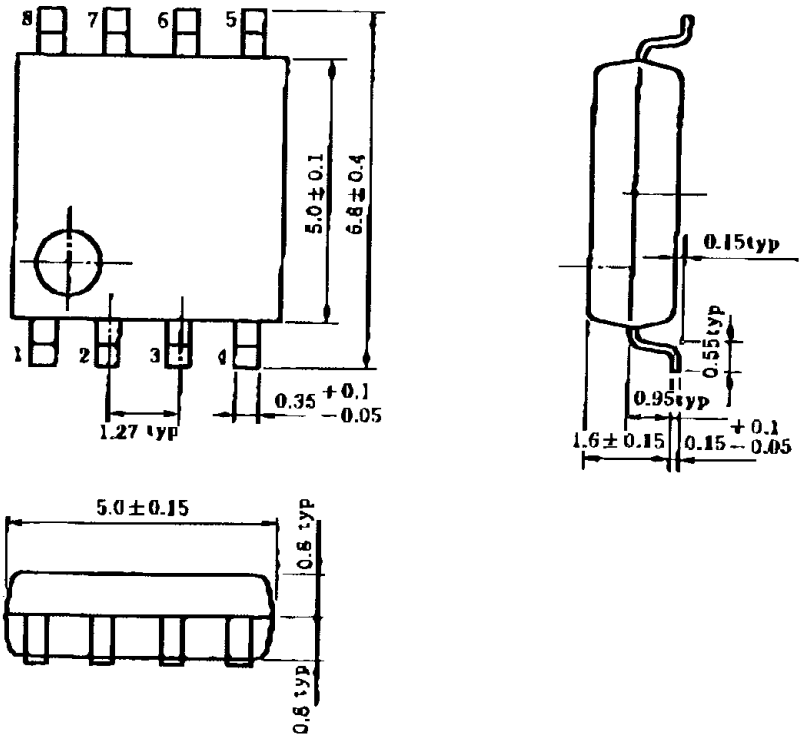
Initially, all bits of RF5H01/RP5H01 are in the "1" state. Data is introduced by selectively programming "0"into the desired bit locations.

The program is operated by setting up $\overline{CE}/V_{PP}=V_{IH}$, and adding the reset pulse, and then applying the 50mS 21V program pulse. The data are verified by making $\overline{CE}/V_{PP}=V_{IL}$. The 2nd bit~the 64th bit are programmed by progressing the addresses in sequence by means of adding the data clock pulse.

● DUMMY BITS

RF5H01/RP5H01 is a one-time PROM. For this reason, it is provided with a dummy bit of 8 bits for test programming. The dummy bit is located after the practical use 64th bit. The address is 8 bits of 1000000~1000111. The built-in counter operates as a 7-bit counter when "Test" (5 pins) is set at V_{CC} level, enabling to select the dummy bit. In the case of the "Test" being GND level, the counter operates as the 6-bit counter, being unable to select the dummy bit. In the 7-bit counter, when the clock pulse is added in sequence, the address progresses from 0000000 to 1111111, and then returns to 0000000.

■ 8-PIN PLASTIC FLAT PACKAGE (EXTERNAL VIEW) (UNIT : mm)



■ 8-PIN PLASTIC DIL PACKAGE (EXTERNAL VIEW) (UNIT : mm)