

SMC82C54C/-6

CMOS PROGRAMMABLE INTERVAL TIMER

- 3 Independent 18-bit Counters
- 6 Programmable Counter Modes
- Low Power

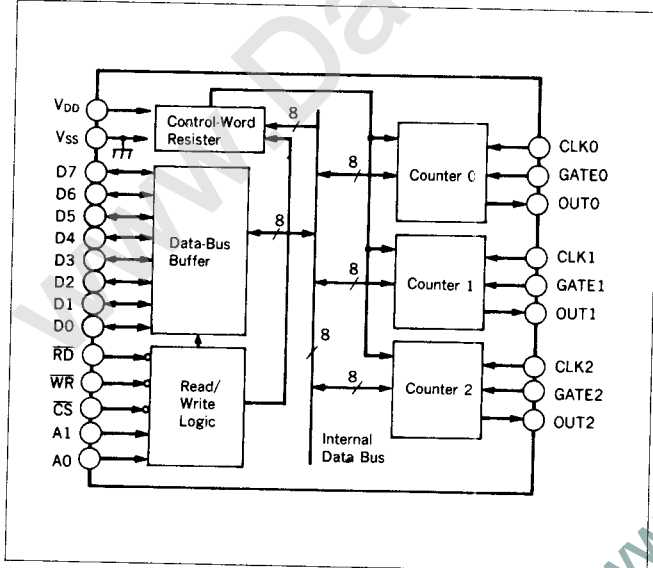
DESCRIPTION

The SMC82C54C^{*1}/-6 is a CMOS Programmable Timer/Counter. It is designed to provide a flexible solution to Timer/Counter requirements in microcomputer systems. The device provides three independent 18-bit counters. Each counter is capable of handling clock inputs up to 8 MHz. This Timer/Counter has six programmable modes.

FEATURES

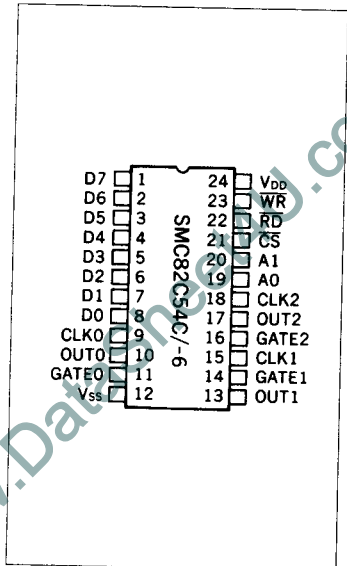
- Compatible with most 8-bit microprocessors
- Three independent 16-bit counters
- Clock input SMC82C54C^{*1} DC to 8MHz
SMC82C54C-6 DC to 6MHz
- Binary or decimal counter
- Six programmable counter modes
- Status poll feature
- Single 5V (±10%) power supply
- Package 24-pin DIP
24-pin SOP^{*2}

BLOCK DIAGRAM



*1 SMC82C54C : Under development
*2 Under development

PIN CONFIGURATION



■ ABSOLUTE MAXIMUM RATINGS

($V_{SS}=0V$, $T_a=25^{\circ}C$)

Parameter	Symbol	Ratings	Unit
Power supply voltage	V_{DD}	-0.3 to 7	V
Input voltage	V_I	-0.3 to $V_{DD}+0.3$	V
Output voltage	V_O	-0.3 to $V_{DD}+0.3$	V
Operating temperature	T_{opr}	-20 to 75	$^{\circ}C$
Storage temperature	T_{stg}	-65 to 150	$^{\circ}C$
Soldering temperature and time	T_{sol}	260 $^{\circ}C$, 10s (at lead)	—

■ RECOMMENDED OPERATING CONDITIONS

($T_a = -20$ to $75^{\circ}C$, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Power supply voltage	V_{DD}	—	4.50	5	5.50	V
Supply voltage (GND)	V_{SS}	—	—	0	—	V

■ ELECTRICAL CHARACTERISTICS

● DC Electrical Characteristics

($T_a = -20$ to $75^{\circ}C$, $V_{DD}=5V \pm 10\%$, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
High-level input voltage	V_{IH}	—	2.0	—	$V_{DD}+0.3$	V
Low-level input voltage	V_{IL}	—	-0.3	—	0.8	V
High-level output voltage	V_{OH}	$V_{SS}=0V$, $I_{OH} = -400\mu A$	2.4	—	—	V
Low-level output voltage	V_{OL}	$V_{SS}=0V$, $I_{OL} = 2.0mA$	—	—	0.45	V
High-level input current	I_{IH}	$V_{SS}=0V$, $V_I = 5.50V$	—	—	± 10	μA
Low-level input current	I_{IL}	$V_{SS}=0V$, $V_I = 0V$	—	—	± 10	μA
Off-state output current	I_{OZ}	$V_{SS}=0V$, $V_I = 0$ to V_{DD}	—	—	± 10	μA
Power supply Current	I_{DD}	SMC82C54C	—	—	10	mA
		$V_{SS}=0V$, $f = 8MHz$				
		SMC82C54C-6	—	—	10	μA
		$V_{SS}=0V$, $f = 6MHz$				
Power supply current during STAND BY	I_{DDB}	$V_{SS}=0V$, other inputs are V_{SS} or V_{DD}	—	—	10	μA
Input capacitance	C_I	$V_{IL} = V_{SS}$, $f = 1MHz$, 25mVrms, $T_a = 25^{\circ}C$	—	—	10	pF
Input/output capacitance	$C_{I/O}$	$V_{I/O} = V_{SS}$, $f = 1MHz$, 25mVrms, $T_a = 25^{\circ}C$	—	—	20	pF

● AC Electrical Characteristics

○ Timing Requirements

($T_a = -20$ to $75^{\circ}C$, $V_{DD}=5V \pm 10\%$, $V_{SS}=0V$, unless otherwise noted)

Read cycle

Parameter	Symbol	Alternative symbol	Conditions	Min	Typ	Max	Unit
Read pulse width	$t_{W(R)}$	t_{RR}	$C_L = 150pF$	150	—	—	ns
\overline{CS} setup time before read	$t_{SU(S-R)}$	t_{SR}		0	—	—	ns
Address setup time before read	$t_{SU(A-R)}$	t_{AR}		45	—	—	ns
Address hold time after read	$t_{H(R-A)}$	t_{RA}		0	—	—	ns
Read recovery time	$t_{rec(R)}$	t_{RV}		200	—	—	ns

Write cycle

Parameter	Symbol	Alternative Symbol	Conditions	Min	Typ	Max	Unit
Write pulse width	$t_{W(W)}$	t_{WW}	$C_L = 150pF$	150	—	—	ns
\overline{CS} setup time before write	$t_{SU(S-W)}$	t_{SW}		0	—	—	ns
Address setup time before write	$t_{SU(A-W)}$	t_{AW}		0	—	—	ns
Address hold time after write	$t_{H(W-A)}$	t_{WA}		0	—	—	ns
Data setup time before write	$t_{SU(D-W)}$	t_{DW}		100	—	—	ns
Data hold time after write	$t_{H(W-D)}$	t_{WD}		0	—	—	ns
Write recovery time	$t_{rec(W)}$	t_{RV}		200	—	—	ns

○ Clock and gate timing

Parameter	Symbol	Alternative symbol	Conditions	Min	Typ	Max	Unit
Clock high pulse width	SMC82C54C	$t_{W(\phi H)}$	$C_L = 150\text{pF}$	60	—	—	ns
	SMC82C54C-6			55	—	—	
Clock low pulse width	SMC82C54C	$t_{W(\phi L)}$		60	—	—	ns
	SMC82C54C-6			110	—	—	
Clock cycle time	SMC82C54C	$t_{C(\phi)}$		125	—	—	ns
	SMC82C54C-6			165	—	—	
	—			—	—	—	
Clock rise time	$t_{r(\phi)}$	t_R		—	—	100	ns
Clock fall time	$t_{f(\phi)}$	t_F		—	—	100	ns
Gate high pulse width	$t_{W(GH)}$	t_{GW}		50	—	—	ns
Gate low pulse width	$t_{W(GL)}$	t_{GL}		50	—	—	ns
Gate setup time before clock	$t_{SU(G-\phi)}$	t_{GS}		50	—	—	ns
Gate hold time after clock	$t_{H(\phi-G)}$	t_{GH}	50	—	—	ns	

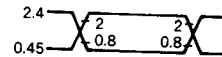
○ Switching Characteristics

($T_a = -20$ to 75°C , $V_{DD} = 5\text{V} \pm 10\%$, $V_{SS} = 0\text{V}$, unless otherwise noted)*

Parameter	Symbol	Alternative symbol	Conditions	Min	Typ	Max	Unit
Propagation time from address to output	$t_{PZV(A-Q)}$	t_{AD}	$C_L = 150\text{pF}$	—	—	220	ns
Propagation time from read to output	SMC82C54C	$t_{PZV(R-Q)}$		—	—	120	
	SMC82C54C-6			—	—	170	ns
Propagation time from read to output floating	$t_{PVZ(R-Q)}$	t_{DF}		5	—	90	
Propagation time from gate to output	$t_{PXV(G-Q)}$	t_{ODG}		—	—	120	ns
Propagation time from clock to output	$t_{PXV(\phi-Q)}$	t_{OD}		—	—	150	ns

* A.C Testing waveform

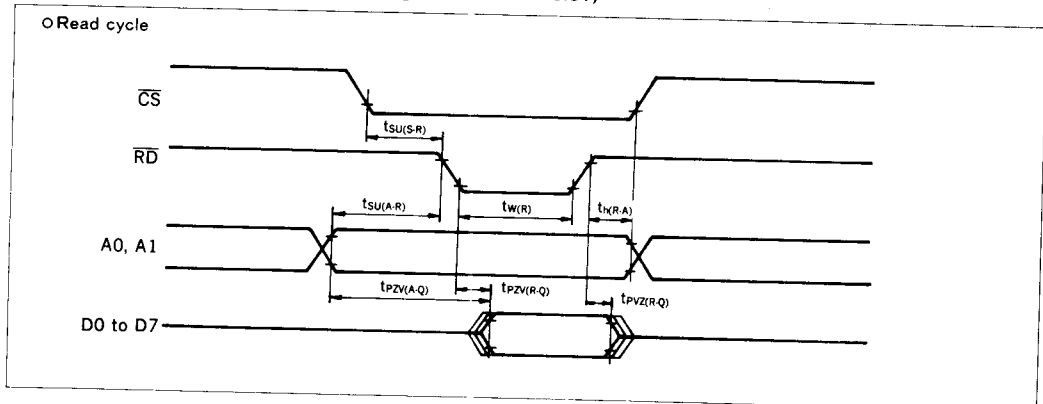
Input pulse level 0.45 to 2.4V
 Input pulse rise time 10ns
 Input pulse fall time 10ns
 Reference level input $V_{IH} = 2\text{V}$, $V_{IL} = 0.8\text{V}$
 Output $V_{OH} = 2\text{V}$, $V_{OL} = 0.8\text{V}$

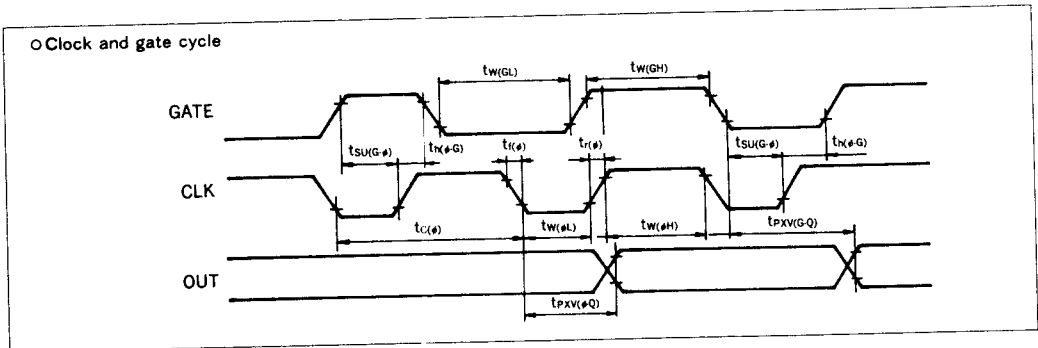
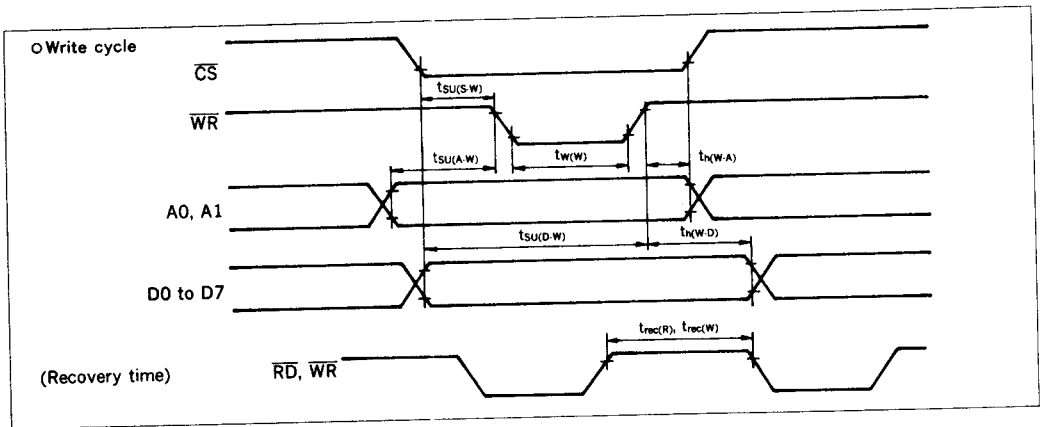


■ FUNCTIONS

There are three independent programmable 16-bit counters. Each counter can operate in any of the six programmable counter modes. Mode 0 (Interrupt on Terminal Count) is typically used for event counting. Mode 1 is a retriggerable one shot. Modes 2 and 3 are typically used as rate generators. Modes 4 and 5 are used as triggered strobes. With software and hardware triggered, respectively. Each counter's status can be monitored by polling via the read back command.

■ TIMING CHART (Reference voltage : High = 2.0V Low = 0.8V)





■ APPLICATION

Delayed time setting, pulse counting and rate generation in microcomputers.

■ PACKAGE DIMENSIONS

