SMC82C54C/-6

CMOS PROGRAMMABLE INTERVAL TIMER

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

■DESCRIPTION

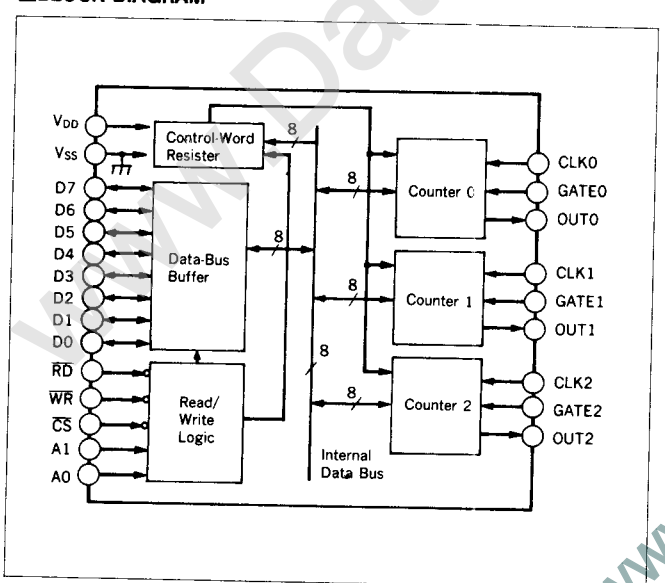
The SMC82C54C*1/-6 is a CMOS Programmable Timer/Counter. It is designed to provide a flexible solution to Timer/Counter requirements in microcomputer systems. The device provides three independent 18-bit counters. Each counter is capable of handling clock inputs up to 8 MHz. This Timer/Counter has six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

■FEATURES

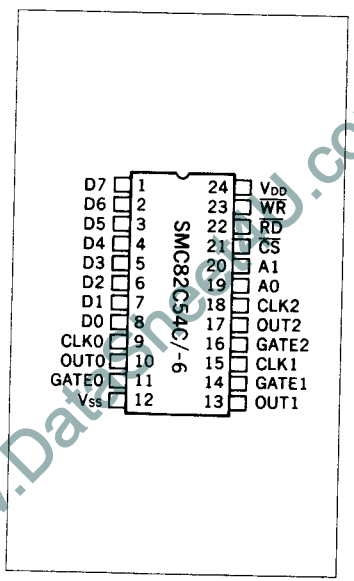
- Compatible with most 8-bit microprocessors
- Three independent 16-bit counters
- Clock input ·····SMC82C54C*1 DC to 8MHz
  SMC82C54C-6 DC to 6MHz
- Binary or decimal counter
- Six programmable counter modes
- Status poll feature
- Single 5V (±10%) power supply
- Package·····24-pin DIP
  24-pin SOP*2

*1 SMC82C54C : Under development
*2 Under development

■BLOCK DIAGRAM



■PIN CONFIGURATION



■ABSOLUTE MAXIMUM RATINGS

(V_{SS}=0V, Ta=25°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	°C
Storage temperature	T_{stg}	−65 to 150	°C
Soldering temperature and time	T_{sol}	260°C, 10s (at lead)	—

■RECOMMENDED OPERATING CONDITIONS

(Ta=−20 to 75°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

(Ta=−20 to 75°C, V_{DD}=5V±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}=−400μA	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: V_{SS}=0V, f=8MHz SMC82C54C-6: V_{SS}=0V, f=6MHz	—	—	10	mA
Power supply current during STAND BY	I_{DDS}	V_{SS}=0V, other inputs are V_{SS} or V_{DD}	—	—	10	μA
Input capacitance	C_I	V_{IL}=V_{SS}, f=1MHz, 25mVrms, Ta=25°C	—	—	10	pF
Input/output capacitance	$C_{I/O}$	$V_{I/OL}$=V_{SS}, f=1MHz, 25mVrms, Ta=25°C	—	—	20	pF

●AC Electrical Characteristics

○Timing Requirements

(Ta=−20 to 75°C, V_{DD}=5V±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	$t_{W(\phi H)}$	t_{PWH}	$C_L = 150pF$	60	—	—	ns
	SMC82C54C-6				55	—	—	
Clock low pulse width	SMC82C54C	$t_{W(\phi L)}$	t_{PWL}		60	—	—	ns
	SMC82C54C-6				110	—	—	
Clock cycle time	SMC82C54C	$t_{C(\phi)}$	t_{CLK}		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

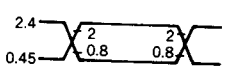
○Switching Characteristics

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

Parameter		Symbol	Alternative symbol	Conditions	Min	Typ	Max	Unit
Propagation time from address to output		$t_{PZV(A-Q)}$	t_{AD}	$C_L = 150pF$	—	—	220	ns
Propagation time from read to output	SMC82C54C	$t_{PZV(R-Q)}$	t_{RD}		—	—	120	ns
	SMC82C54C-6				—	—	170	
Propagation time from read to output floating		$t_{PVZ(R-Q)}$	t_{DF}		5	—	90	ns
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	$V_{IH} = 2V$, $V_{IL} = 0.8V$
Output	$V_{OH} = 2V$, $V_{OL} = 0.8V$

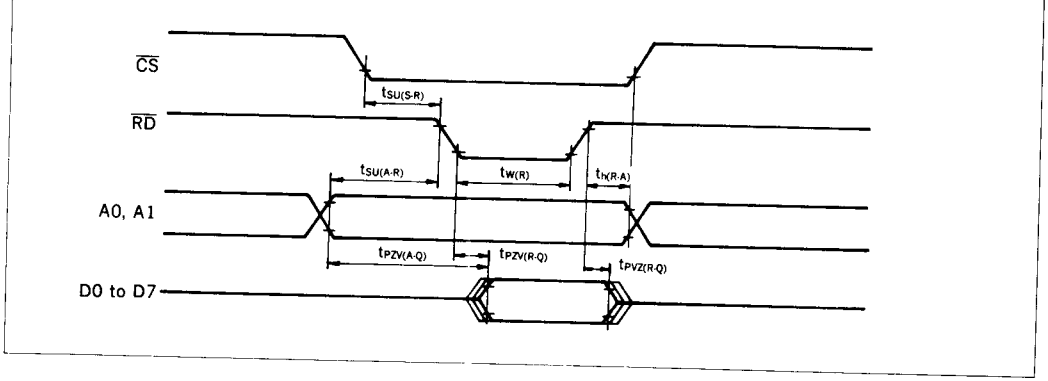


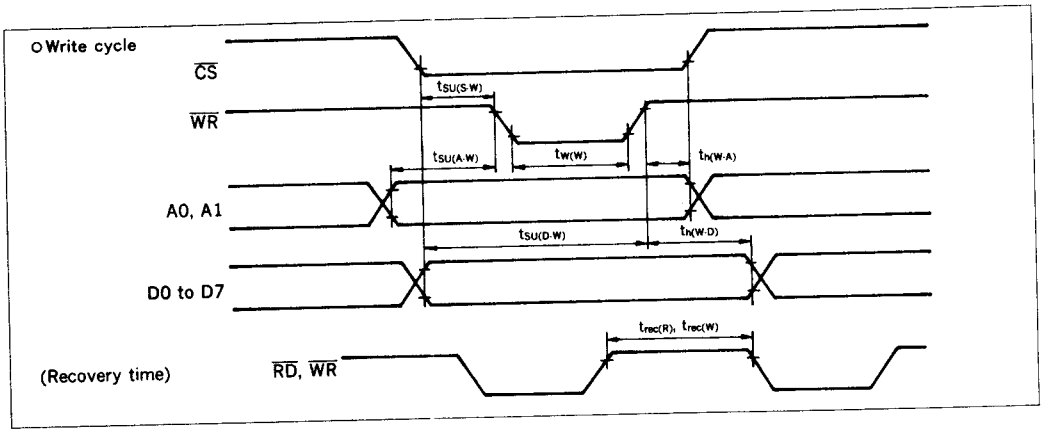
■FUNCTIONS

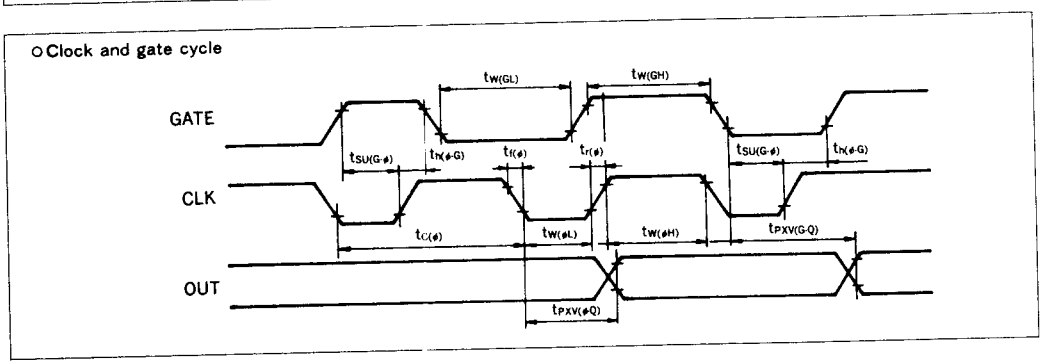
There are three independent programmable 16-bit counters. Each counter can operate in any of the six programmable counter modes. Mode 0(Interrupt on Terminal Count) is typically used for event counting. Mode 1 is a retriggerable one shot. Modes 2 and 3 are typically used as rate generators. Modes 4 and 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)

○Read cycle







■APPLICATION

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

■PACKAGE DIMENSIONS