82C54

CMOS Programmable Interval Timer

MILITARY INFORMATION

DISTINCTIVE CHARACTERISTICS

- Compatible with all Intel and most other microprocessors
- High-speed, zero-wait-state operation with 10-MHz 8086/88 and 80186/188
- Three independent 16-bit counters
- Handles inputs from DC to 8 MHz
  - 10 MHz for 82C54-2
  - 12.5 MHz for 82C54-12
- Low-power CMOS
  - I_{CC} = 50 μA military standby current I_{CC}
- Completely TTL compatible
- Six programmable counter modes
- Binary or BCD counting
- Status read-back command
- Available in 24-pin DIP

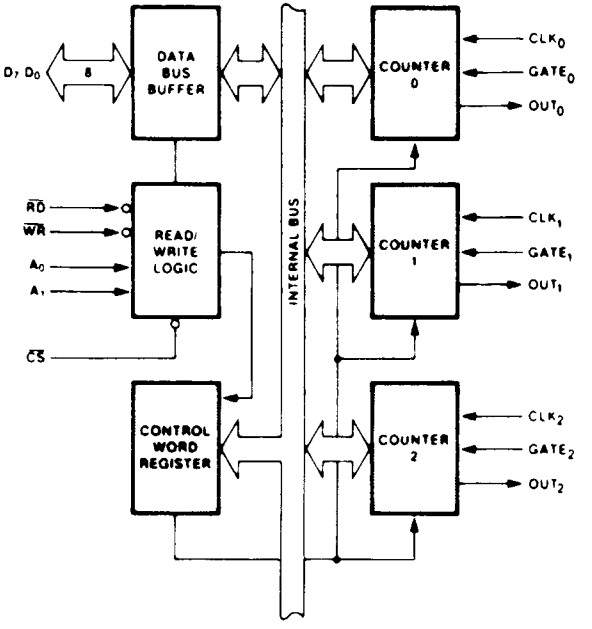
GENERAL DESCRIPTION

The AMD 82C54 is a high-performance, CMOS version of the industry-standard 8254 counter/timer which is designed to solve the timing-control problems common in microcomputer system design. It provides three independent 16-bit Counters — each capable of handling clock inputs up to 12.5 MHz. All modes are software-programmable. The 82C54 is pin-compatible with the NMOS 8254 and is a superset of the 8253.

Six programmable-timer modes allow the 82C54 to be used as an event counter, elapsed time indicator, programmable one-shot, and in many other applications as well.

The 82C54 is fabricated with AMD's CMOS technology providing low-power consumption with performance equal to or greater than the equivalent NMOS product. The 82C54 is available in 24-pin DIP package.

BLOCK DIAGRAM



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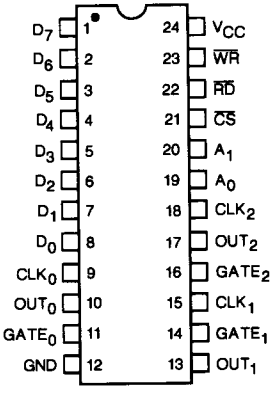
CONNECTION DIAGRAM
Top View

DIP



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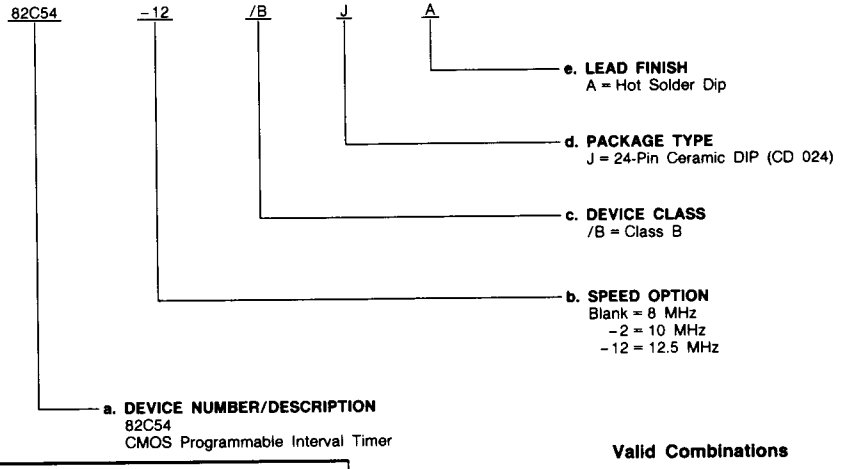
Note: Pin 1 is marked for orientation.

MILITARY ORDERING INFORMATION

APL Products

AMD products for Aerospace and Defense applications are available in several packages and operating ranges. APL (Approved Products List) products are fully compliant with MIL-STD-883C requirements. The order number (Valid Combination) for APL products is formed by a combination of: **a. Device Number**
b. Speed Option (if applicable)
c. Device Class
d. Package Type
e. Lead Finish



Valid Combinations	
82C54	/BJA
82C54-2	
82C54-12	

Valid Combinations

Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations or to check for newly released valid combinations.

Group A Tests

Group A tests consist of Subgroups 1, 2, 3, 7, 8, 9, 10, 11.

ABSOLUTE MAXIMUM RATINGS

Storage Temperature ..... −65 to +150°C
Voltage on Any Pin
with Respect to GND ..... −0.5 to +7.0 V
Power Dissipation ..... 1 W

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

OPERATING RANGES

Military (M) Devices
Temperature (T_C) ..... −55 to +125°C
Supply Voltage (V_{CC}) ..... 5 V ±10%

Operating ranges define those limits between which the functionality of the device is guaranteed.

DC CHARACTERISTICS over operating range (for APL Products, Group A, Subgroups 1, 2, 3 are tested unless otherwise noted)

Parameter Symbol	Parameter Description	Test Conditions		Min.	Max.	Unit
V_{IL}	Input LOW Voltage			−0.5*	0.8	V
V_{IH}	Input HIGH Voltage			2.2	V_{CC}+0.5 V*	V
V_{OL}	Output LOW Voltage	I_{OL} = 2.0 mA			.45	V
V_{OH}	Output HIGH Voltage	I_{OH} = −400 μA		2.4		V
I_{IL}	Input Load Current	V_{IN} = V_{CC} to 0 V			±10	μA
I_{OFL}	Output Float Leakage Current	V_{OUT} = V_{CC} to 0 V			±10	μA
I_{CC}	Operating Power-Supply Current (Note 1)	CLK Freq =	8 MHz		20	mA
			10 MHz		20	
			12.5 MHz		20	
I_{CCSB}	Standby Power-Supply Current (Note 2)	CLK Freq = DC, CS = HIGH, All Inputs/Data Bus HIGH, All Outputs Floating			±50	μA

CAPACITANCE (T_C = 25°C, V_{CC} = GND = 0 V)

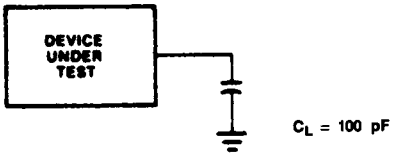
Parameter Symbol	Parameter Description	Test Conditions	Min.	Max.	Units
C_{IN} †	Input Capacitance	fc = 1 MHZ Unmeasured pins returned to GND		10*	pF
$C_{I/O}$ †	I/O Capacitance			20*	pF
C_{OUT} †	Output Capacitance			20*	pF

* Guaranteed by design; not tested.
† Not included in Group A tests.

Notes: 1. I_{CC} is measured in a dynamic condition with no output loads applied and inputs at rail levels.
2. Standby I_{CC} is measured in a static condition (CLK = DC) with no output loads applied, and $\overline{CS}$ and all inputs/databus at the V_{CC} rail level.

See Section 6 of the MOS Microprocessors and Peripherals Data Book (Order #09067A) for Thermal Characteristics Information.

SWITCHING TEST CIRCUIT



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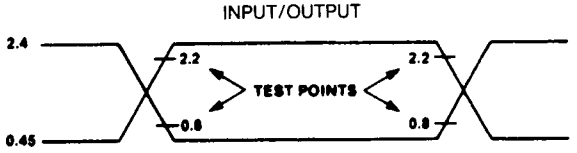
C_L = 100 pF
C_L includes jig capacitance

SWITCHING TEST WAVEFORM



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A.C. Testing: Inputs are driven at 2.4 V for a logic "1" and 0.45 V for a logic "0." Timing measurements are made at 2.2 V for a logic "1" and 0.8 V for a logic "0."

SWITCHING CHARACTERISTICS over operating range (for APL Products, Group A, Subgroups 9, 10, 11 are tested unless otherwise noted) (Note 1).

No.	Parameter Symbol	Parameter Description	8 MHz		10 MHz		12.5 MHz		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	
READ CYCLE									
1	t_{AR}	Address Stable Before $\overline{RD}$ ↓	45		30		25		ns
2	t_{SR}	$\overline{CS}$ Stable Before $\overline{RD}$ ↓	0		0		0		ns
3	t_{RA}	Address Hold Time After $\overline{RD}$ ↑	0		0		0		ns
4	t_{RR}	$\overline{RD}$ Pulse Width	150		95		90		ns
5	t_{RD}	Data Delay from $\overline{RD}$ ↓		120		85		80	ns
6	t_{AD}	Data Delay from Address		220		185		150	ns
7	t_{DF}	$\overline{RD}$ ↑ to Data Floating	5	90	5	65	5	55	ns
8	t_{RV}	Command Recovery Time	200		165		135		ns
WRITE CYCLE									
9	t_{AW}	Address Stable Before $\overline{WR}$ ↓	0		0		0		ns
10	t_{SW}	$\overline{CS}$ Stable Before $\overline{WR}$ ↓	0		0		0		ns
11	t_{WA}	Address Hold Time After $\overline{WR}$ ↑	0		0		0		ns
12	t_{WW}	$\overline{WR}$ Pulse Width	150		95		80		ns
13	t_{DW}	Data Setup Time Before $\overline{WR}$ ↑	150		95		80		ns
14	t_{WD}	Data Hold Time After $\overline{WR}$ ↑	0		0		0		ns
15	t_{RV}	Command Recovery Time	200		165		135		ns
CLOCK AND GATE CYCLE									
16	t_{CLK}	Clock Period	125	DC	100	DC	80	DC	ns
17	t_{PWH}	HIGH Pulse Width (Note 3)	60		30		30		ns
18	t_{PWL}	LOW Pulse Width (Note 3)	60		50		40		ns
19	t_R	Clock Rise Time (Note 4)		25		25		25	ns
20	t_F	Clock Fall Time (Note 4)		25		25		25	ns
21	t_{GW}	Gate Width HIGH	50		50		40		ns
22	t_{GL}	Gate Width LOW	50		50		40		ns
23	t_{GS}	Gate Setup Time to CLK ↑	50		40		30		ns
24	t_{GH}	Gate Hold Time After CLK ↑ (Note 2)	50		50		40		ns
25	t_{OD}	Output Delay from CLK ↓		150		100		80	ns
26	t_{ODG}	Output Delay from Gate ↓		120		100		80	ns
27	t_{WC}	CLK Delay for Loading	0	55	0	55	0	45	ns
28	t_{WG}	Gate Delay for Sampling	−5	50	−5	40	−5	35	ns
29	t_{WO}	Out Delay from Mode Write		260		240		200	ns
30	t_{CL}	CLK Set Up for Count Latch	−4	45	−4	40	−4	35	ns

Notes: 1. Timings measured at V_{OH} = 2.2 V, V_{OL} = 0.8 V. C_L = 100 pF ±20 pF.
2. In Modes 1 and 5, triggers are sampled on each rising clock edge. A second trigger within 120 ns (70 ns for the 82C54-2) of the rising clock edge may not be detected.
3. LOW-going glitches that violate t_{PWH}, t_{PWL} may cause errors requiring Counter re-programming.
4. Clock rise and fall times are tested at 5 ns, guaranteed by Teradyne J941 test equipment.