

DUAL CMOS TIMER

Description

The μ PD5556 is a dual CMOS RC timer providing significantly improved performance over the standard bipolar 556 timer, while at the same time being direct replacement for that device in most applications. Improved parameters include low supply current, wide operating supply voltage range, THRESHOLD, TRIGGER and RESET currents as low as 2 pA, no crowbaring of the power supply during output transitions, higher frequency performance, and no requirement to decouple control voltage for stable operation.

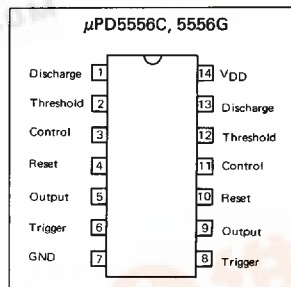
Specifically, the μ PD5556 is stable controller capable of producing accurate time delays or frequencies.

In the one-shot mode, the pulse width of each circuit is precisely controlled by one external resistor and capacitor. For astable operation as an oscillator, the free running frequency and the duty cycle are controlled by two external resistors and one capacitor. The circuits can source or sink current large enough to drive TTL loads or provide minimal offsets to drive CMOS loads.

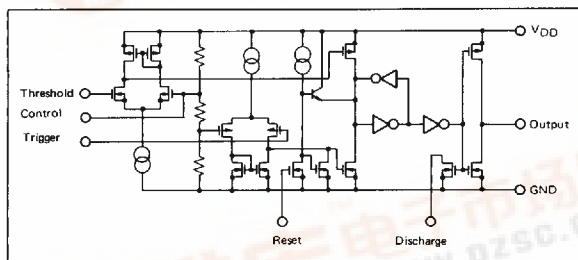
Features

- Exact equivalent in most cases for industry standard 556 timer
- Low supply current
- 3 to 16 V operating voltage range
- Timing from microseconds through hours

CONNECTION DIAGRAM (Top View)



EQUIVALENT CIRCUIT (1/2 circuit)



ORDERING INFORMATION

Part Number	Package
μ PD5556C	14 PIN PLASTIC DIP (300 mil)
μ PD5556G2	14 PIN PLASTIC SOP (225 mil)



ABSOLUTE MAXIMUM RATINGS (T_a=25 °C)

PARAMETER		SYMBOL	μPD5555	UNIT
Supply Voltage		V _{DD}	18	V
Input Voltage (Trigger, Threshold Reset, Control)		V _{IN}	$GND - 0.3 \leq V_{IN} \leq V_{DD} + 0.3$	V
Output Current		I _O	100	mA
Operating Temperature Range		T _{opt}	-20 ~ +70	°C
Storage Temperature Range		T _{stg}	-55 ~ +125	°C
Power Dissipation	C Package	P _T	570	mW
	G Package (Note 1)		550	

Note 1: Thermal derating factor is 5.5 mW/°C when ambient temperature is higher than 25 °C.

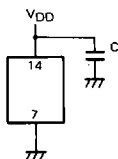
RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Oscillation Frequency				500	kHz
Supply Voltage	V _{DD}	3		16	V
Input Voltage	V _{IN}	0		V _{DD}	V
Output Sink Current	I _O SINK			3.2	mA
Output Source Current	I _O SOURCE			1	mA
Operating Temperature	T _{opt}	-20		70	°C

ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$, $V_{DD}=+3\sim+15\text{ V}$)

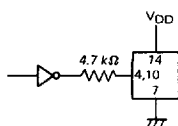
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Supply Current	I_{DD}		150	500	μA	$V_{DD}=5\text{ V}$
			200	700		$V_{DD}=15\text{ V}$
Threshold Voltage	V_{th}		$2/3 V_{DD}$		V	
Threshold Current	I_{th}		50		pA	$V_{DD}=15\text{ V}$
			10			$V_{DD}=5\text{ V}$
			1			$V_{DD}=3\text{ V}$
Trigger Voltage	V_{tr}		$1/3 V_{DD}$		V	
Trigger Current	I_{tr}		50		pA	$V_{DD}=15\text{ V}$
			10			$V_{DD}=5\text{ V}$
			1			$V_{DD}=3\text{ V}$
Reset Voltage (V_O becoms low)	V_{reset}	0.6	1.1	2.0	V	$V_{DD}=15\text{ V}$
		0.6	1.1	2.0		$V_{DD}=3\text{ V}$
Reset Current	I_{reset}		100		pA	$V_{RESET}=GND$, $V_{DD}=15\text{ V}$
			20			$V_{RESET}=GND$, $V_{DD}=5\text{ V}$
			2			$V_{RESET}=GND$, $V_{DD}=3\text{ V}$
Output Low Voltage	V_{OL}		0.06	0.4	V	$V_{DD}=15\text{ V}$, $I_{SINK}=3.2\text{ mA}$
			0.14	0.4		$V_{DD}=5\text{ V}$, $I_{SINK}=3.2\text{ mA}$
Output High Voltage	V_{OH}	14.25	14.85		V	$V_{DD}=15\text{ V}$, $I_{SOURCE}=1\text{ mA}$
		4.0	4.7			$V_{DD}=5\text{ V}$, $I_{SOURCE}=1\text{ mA}$
Output Rise Time	t_{rise}		60		ns	$R_L=10\text{ M}\Omega$, $C_L=7\text{ pF}$, $V_{DD}=5\text{ V}$
Output Fall Time	t_{fall}		60		ns	$R_L=10\text{ M}\Omega$, $C_L=7\text{ pF}$, $V_{DD}=5\text{ V}$
Max. Oscillation Frequency		500			kHz	Astable Operation
Propagation Delay	t_{pd}		400		ns	Monostable Operation Trigger Level = $0.1 \cdot V_{DD}$
Minimum Trigger Pulse Width ($V_{DD}=5\text{ V}$)	t_{tr}		190		ns	Trigger Level = $0.1 \cdot V_{DD}$
Control Voltage	V_{cont}		$2/3 V_{DD}$		V	
Timing Error			2		%	$R_1, R_2=1\text{ k}\sim 100\text{ k}\Omega$ $C=0.1\text{ }\mu\text{F}$ $V_{DD}=5\sim 15\text{ V}$
Initial Accuracy						
Temperature Drift			50		ppm/ $^\circ\text{C}$	
Supply Voltage Drift			1		%/V	

Note 1: To reduce transient switching noise on the supply voltage line, install a bypass capacitor from V_{DD} to ground. Connect the capacitor, with value listed below, close to V_{DD} .

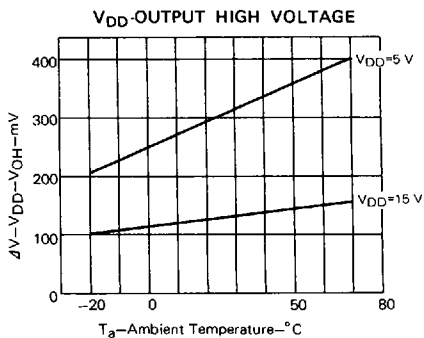
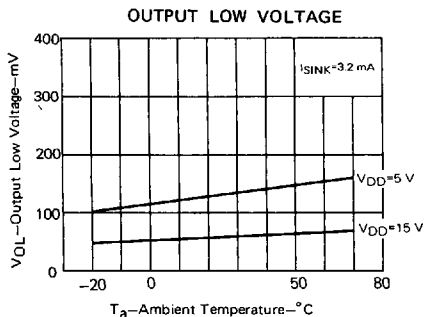
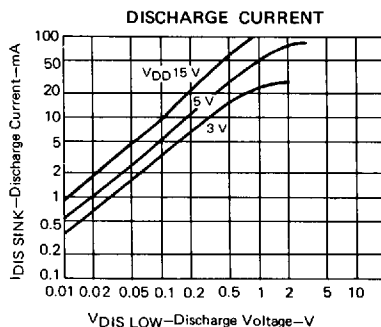
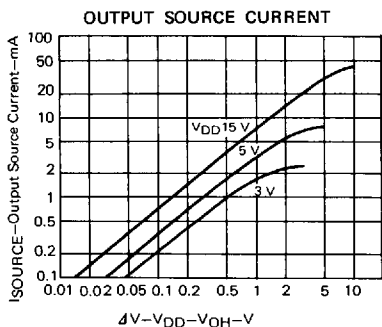
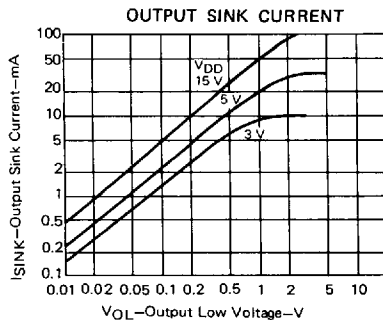
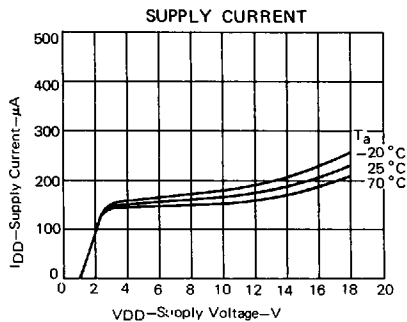


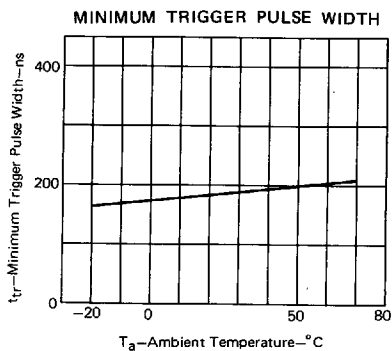
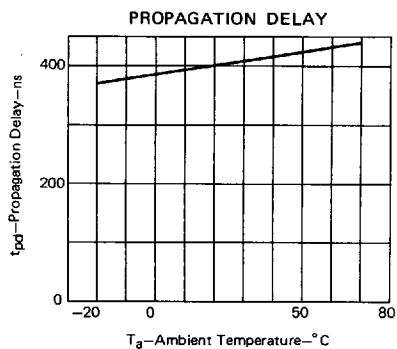
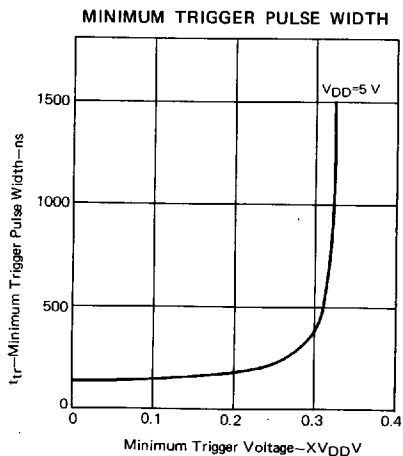
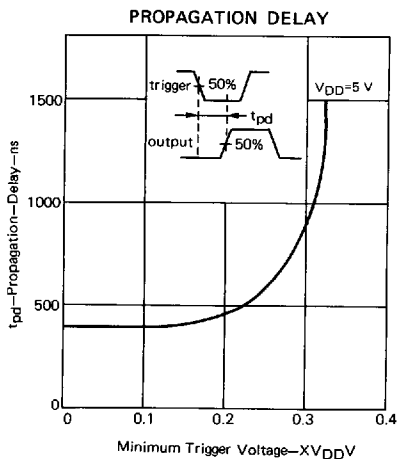
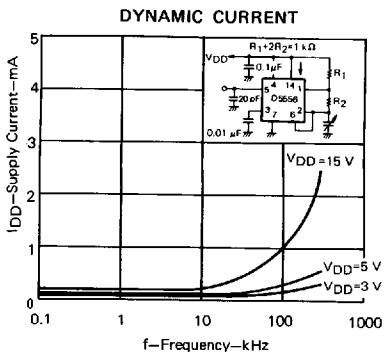
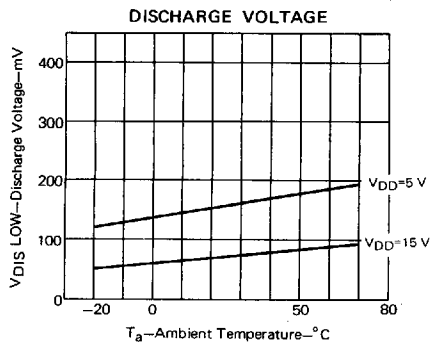
Capacitance $C \geq 0.047\text{ }\mu\text{F}$ $V_{DD} \leq 10\text{ V}$
 $C \geq 0.1\text{ }\mu\text{F}$ $V_{DD} \geq 10\text{ V}$

Note 2: Install a series resistor ($R \geq 4.7\text{ k}\Omega$) to Reset, when reset is controlled by digital devices.

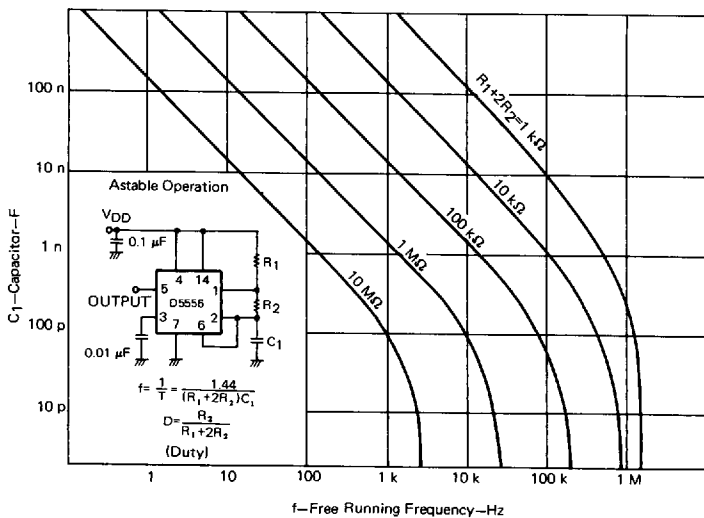


TYPICAL PERFORMANCE CHARACTERISTICS
($T_a = 25^\circ\text{C}$)

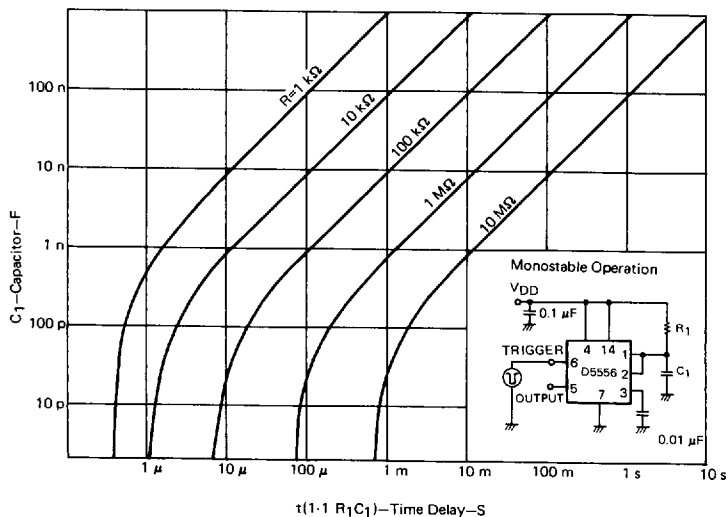




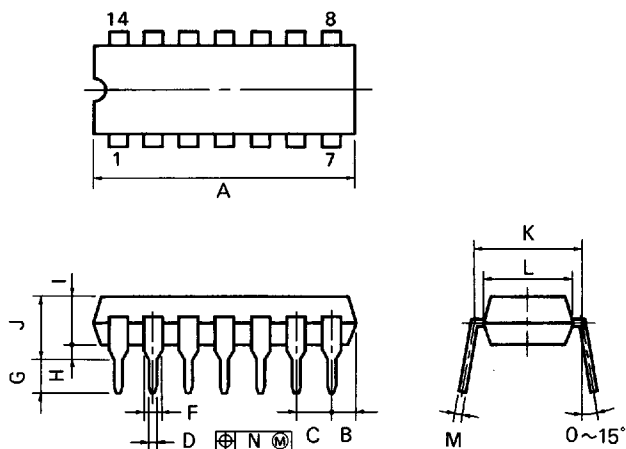
FREE RUNNING FREQUENCY



TIME DELAY



14PIN PLASTIC DIP (300 mil)



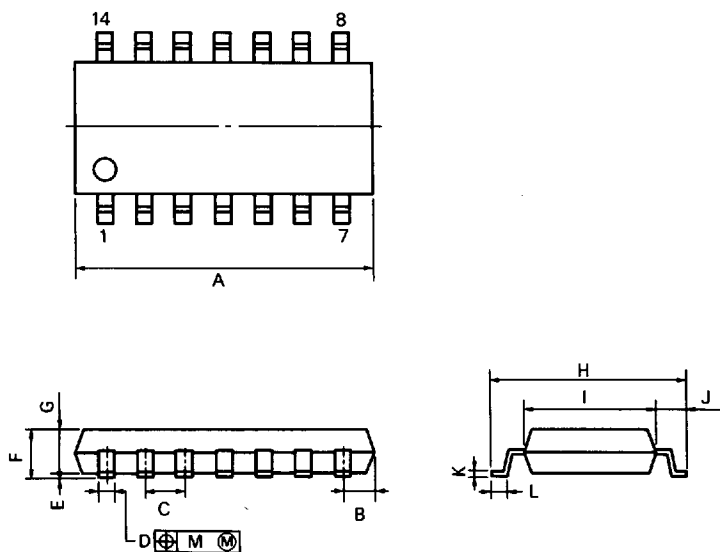
P14C-100-300B1

NOTES

- 1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.
- 2) Item "K" to center of leads when formed parallel.

ITEM	MILLIMETERS	INCHES
A	20.32 MAX.	0.800 MAX.
B	2.54 MAX.	0.100 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
D	0.50 ± 0.10	0.020 ± 0.004
F	1.2 MIN.	0.047 MIN.
G	3.6 ± 0.3	0.142 ± 0.012
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.08 MAX.	0.200 MAX.
K	7.62 (T.P.)	0.300 (T.P.)
L	6.4	0.252
M	0.25 ± 0.10 -0.08	0.010 ± 0.004 -0.003
N	0.25	0.01

14PIN PLASTIC SOP (225 mil)



S14GM-50-225B, C

NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	10.46 MAX.	0.412 MAX.
B	1.42 MAX.	0.056 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	$0.40^{+0.10}_{-0.08}$	$0.016^{+0.004}_{-0.003}$
E	$0.1^{+0.1}_{-0.0}$	$0.004^{+0.004}_{-0.000}$
F	1.8 MAX.	0.071 MAX.
G	1.49	0.059
H	$6.5^{+0.3}_{-0.0}$	$0.256^{+0.012}_{-0.000}$
I	4.4	0.173
J	1.1	0.043
K	$0.15^{+0.10}_{-0.08}$	$0.006^{+0.004}_{-0.002}$
L	$0.6^{+0.2}_{-0.0}$	$0.024^{+0.008}_{-0.000}$
M	0.12	0.005