DUAL LINCMOS™ TIMER
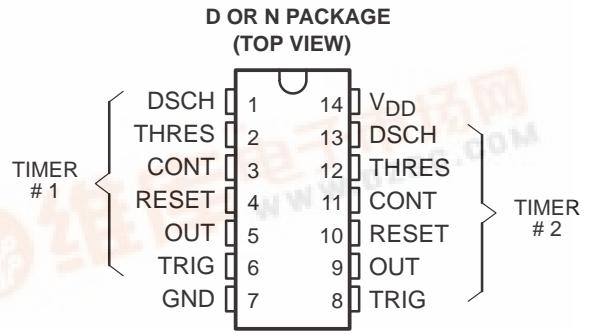
- **Very Low Power Consumption . . . 2 mW Typ at V_{DD} = 5 V**
- **Capable of Operation in Astable Mode**
- **CMOS Output Capable of Swinging Rail to Rail**
- **High Output-Current Capability**
    - **Sink 100 mA Typ**
    - **Source 10 mA Typ**
- **Output Fully Compatible With CMOS, TTL, and MOS**
- **Low Supply Current Reduces Spikes During Output Transitions**
- **High-Impedance Inputs . . . 10^{12} Ω Typ**
- **Single-Supply Operation From 1 V to 18 V**
- **Functionally Interchangeable With the NE556; Has Same Pinout**

D OR N PACKAGE
(TOP VIEW)

TIMER #1
|			
DSCH	1	14	V_{DD}
THRES	2	13	DSCH
CONT	3	12	THRES
RESET	4	11	CONT
OUT	5	10	RESET
TRIG	6	9	OUT
GND	7	8	TRIG

TIMER #2

description

The TLC552 is a dual monolithic timing circuit fabricated using TI LinCMOS™ process, which provides full compatibility with CMOS, TTL, and MOS logic and operation at frequencies up to 2 MHz. Accurate time delays and oscillations are possible with smaller, less-expensive timing capacitors than the NE555 because of the high input impedance. Power consumption is low across the full range of power supply voltages.

Like the NE556, the TLC552 has a trigger level approximately one-third of the supply voltage and a threshold level approximately two-thirds of the supply voltage. These levels can be altered by use of the control voltage terminal. When the trigger input falls below the trigger level, the flip-flop is set and the output goes high. If the trigger input is above the trigger level and the threshold input is above the threshold level, the flip-flop is reset and the output is low. The reset input can override all other inputs and can be used to initiate a new timing cycle. If the reset input is low, the flip-flop is reset and the output is low. Whenever the output is low, a low-impedance path is provided between the discharge terminal and ground.

functional block diagram (each timer)
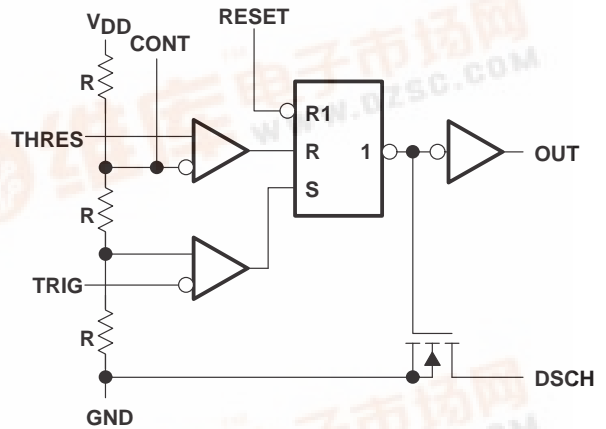
RESET can override TRIG and THRES.
TRIG can override THRES.

AVAILABLE OPTIONS

SYMBOLIZATION		OPERATING TEMPERATURE RANGE	V_T max at 25°C
DEVICE	**PACKAGE SUFFIX**		
TLC552C	D,N	0°C to 70°C	3.8 mV

The D packages are available taped and reeled. Add the suffix R to the device type when ordering (i.e., TLC552CDR).

While the CMOS output is capable of sinking over 100 mA and sourcing over 10 mA, the TLC552 exhibits greatly reduced supply-current spikes during output transitions. This minimizes the need for the large decoupling capacitors required by the NE556.

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TEXAS INSTRUMENTS

TLC552C
DUAL LINCMOS™ TIMER

description (continued)

These devices have internal electrostatic discharge (ESD) protection circuits that will prevent catastrophic failures at voltages up to 2000 V as tested under MIL-STD-883C, Method 3105.2. However, care should be exercised in handling these devices as exposure to ESD may result in a degradation of the device parametric performance.

All unused inputs should be tied to an appropriate logic level to prevent false triggering.

The TLC552C is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

RESET VOLTAGE†	TRIGGER VOLTAGE†	THRESHOLD VOLTAGE†	OUTPUT	DISCHARGE SWITCH
< MIN	Irrelevant	Irrelevant	Low	On
> MAX	< MIN	Irrelevant	High	Off
> MAX	> MAX	> MAX	Low	On
> MAX	> MAX	< MIN	As previously established	

† For conditions shown as MIN or MAX, use the appropriate value specified under electrical characteristics.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{DD} (see Note 1) .... 18 V
Input voltage range (any input) .... − 0.3 V to V_{DD}
Sink current, DSCH or OUT .... 150 mA
Source current, OUT .... 15 mA
Continuous total dissipation .... See Dissipation Rating Table
Operating free-air temperature range .... 0°C to 75°C
Storage temperature range .... − 65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds .... 260°C

NOTES: 1. All voltage values are with respect to network ground terminal.

DISSIPATION RATING TABLE

PACKAGE	POWER RATING	DERATING FACTOR	ABOVE T_A
D	950 mW	7.6 mW/°C	25°C
N	1150 mW	9.2 mW/°C	25°C

recommended operating conditions

	MIN	MAX	UNIT
Supply voltage, V_{DD}	1	18	V
Operating free-air temperature range, T_A	0	70	°C

electrical characteristics at specified free-air temperature, V_{DD} = 1 V

PARAMETER	TEST CONDITIONS	T_A†	MIN	TYP	MAX	UNIT
Threshold voltage level		25°C	0.475	0.67	0.85	V
		Full range	0.45		0.875	
Threshold current		25°C		10		pA
		MAX		75		
Trigger voltage level		25°C	0.15	0.33	0.425	V
		Full range	0.1		1.45	
Trigger current		25°C		10		pA
		MAX		75		
Reset voltage level		25°C	0.4	0.7	1	V
		Full range	0.3		1	
Reset current		25°C		10		pA
		MAX		75		
Control voltage (open-circuit) as a percentage of supply voltage		MAX		66.7%		
Discharge switch on-state voltage	I_{OL} = 100 μA	25°C		0.02	0.15	V
		Full range			0.2	
Discharge switch off-state current		25°C		0.1		nA
		MAX		0.5		
Low-level output voltage	I_{OL} = 100 μA	25°C		0.03	0.2	V
		Full range			0.25	
High-level output voltage	I_{OH} = −10 μA	25°C	0.6	0.98		V
		Full range	0.6			
Supply current		25°C		30	200	μA
		Full range			300	

† Full range (MIN to MAX) is 0°C to 70°C.

electrical characteristics at specified free-air temperature, V_{DD} = 2 V

PARAMETER	TEST CONDITIONS	T_A†	MIN	TYP	MAX	UNIT
Threshold voltage level		25°C	0.95	1.33	1.65	V
		Full range	0.85		1.75	
Threshold current		25°C		10		pA
		MAX		75		
Trigger voltage level		25°C	0.4	0.67	0.95	V
		Full range	0.3		1.05	
Trigger current		25°C		10		pA
		MAX		75		
Reset voltage level		25°C	0.4	1.1	1.5	V
		Full range	0.3		1.8	
Reset current		25°C		10		pA
		MAX		75		
Control voltage (open-circuit) as a percentage of supply voltage		MAX		66.7%		
Discharge switch on-state voltage	I_{OL} = 1 mA	25°C		0.03	0.2	V
		Full range			0.25	
Discharge switch off-state current		25°C		0.1		nA
		MAX		0.5		
Low-level output voltage	I_{OL} = 1 mA	25°C		0.07	0.3	V
		Full range			0.35	
High-level output voltage	I_{OH} = −300 µA	25°C	1.5	1.9		V
		Full range	1.5			
Supply current		25°C		130	500	µA
		Full range			800	

† Full range (MIN to MAX) is 0°C to 70°C.

electrical characteristics at specified free-air temperature, V_{DD} = 5 V

PARAMETER	TEST CONDITIONS	T_A†	MIN	TYP	MAX	UNIT
Threshold voltage level		25°C	2.8	3.3	3.8	V
		Full range	2.7		3.9	
Threshold current		25°C		10		pA
		MAX		75		
Trigger voltage level		25°C	1.36	1.66	1.96	V
		Full range	1.26		2.06	
Trigger current		25°C		10		pA
		MAX		75		
Reset voltage level		25°C	0.4	1.1	1.5	V
		Full range	0.3		1.8	
Reset current		25°C		10		pA
		MAX		75		
Control voltage (open-circuit) as a percentage of supply voltage		MAX		66.7%		
Discharge switch on-state voltage	I_{OL} = 10 mA	25°C		0.14	0.5	V
		Full range			0.6	
Discharge switch off-state current		25°C		0.1		nA
		MAX		0.5		
Low-level output voltage	I_{OL} = 8 mA	25°C		0.21	0.4	V
		Full range			0.5	
	I_{OL} = 5 mA	25°C		0.13	0.3	
		Full range			0.4	
	I_{OL} = 3.2 mA	25°C		0.08	0.3	
		Full range			0.35	
High-level output voltage	I_{OH} = −1 mA	25°C	4.1	4.8		V
		Full range	4.1			
Supply current		25°C		340	700	µA
		Full range			1000	

† Full range (MIN to MAX) is 0°C to 70°C.

TLC552C
DUAL LINCMOS™ TIMER

electrical characteristics at specified free-air temperature, V_{DD} = 15 V

PARAMETER	TEST CONDITIONS	T_A†	MIN	TYP	MAX	UNIT
Threshold voltage level		25°C	9.45	10	10.55	V
		Full range	9.35		10.65	
Threshold current		25°C		10		pA
		MAX		75		
Trigger voltage level		25°C	4.65	5	5.35	V
		Full range	4.55		5.45	
Trigger current		25°C		10		pA
		MAX		75		
Reset voltage level		25°C	0.4	1.1	1.5	V
		Full range	0.3		1.8	
Reset current		25°C		10		pA
		MAX		75		
Control voltage (open-circuit) as a percentage of supply voltage		MAX		66.7%		
Discharge switch on-state voltage	I_{OL} = 100 mA	25°C		0.77	1.7	V
		Full range			1.8	
Discharge switch off-state current		25°C		0.1		nA
		MAX		0.5		
Low-level output voltage	I_{OL} = 100 mA	25°C		1.28	3.2	V
		Full range			3.6	
	I_{OL} = 50 mA	25°C		0.63	1	
		Full range			1.3	
	I_{OL} = 10 mA	25°C		0.12	0.3	
		Full range			0.4	
High-level output voltage	I_{OH} = −10 mA	25°C	12.5	14.2		V
		Full range	12.5			
	I_{OH} = −5 mA	25°C	13.5	14.6		
		Full range	13.5			
	I_{OH} = −1 mA	25°C	14.2	14.9		
		Full range	14.2			
Supply current		25°C		0.72	1.2	mA
		Full range			1.6	

† Full range (MIN to MAX) is 0°C to 70°C.

electrical characteristics at specified free-air temperature, V_{DD} = 18 V

PARAMETER	TEST CONDITIONS	T_A†	MIN	TYP	MAX	UNIT
Threshold voltage level		25°C	11.4	12	12.6	V
		Full range	10.9		12.7	
Threshold current		25°C		10		pA
		MAX		75		
Trigger voltage level		25°C	5.6	6	6.4	V
		Full range	5.5		6.5	
Trigger current		25°C		10		pA
		MAX		75		
Reset voltage level		25°C	0.4	1.1	1.5	V
		Full range	0.3		1.8	
Reset current		25°C		10		pA
		MAX		75		
Control voltage (open-circuit) as a percentage of supply voltage		MAX		66.7%		
Discharge switch on-state voltage	I_{OL} = 100 mA	25°C		0.72	1.5	V
		Full range			1.6	
Discharge switch off-state current		25°C		0.1		nA
		MAX		0.5		
Low-level output voltage	I_{OL} = 3.2 mA	25°C		0.04	0.3	V
		Full range			0.35	
High-level output voltage	I_{OH} = −1 mA	25°C	17.3	17.9		V
		Full range	17.3			
Supply current		25°C		0.84	1.2	mA
		Full range			1.6	

† Full range (MIN to MAX) is 0°C to 70°C.

operating characteristics, V_{DD} = 5 V, T_A = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Initial error of timing interval‡	V_{DD} = 5 V to 15 V, C_T = 0.1 µF,	R_A = R_B = 1 kΩ to 100 kΩ, See Note 2		1%	3%	
Supply voltage sensitivity of timing interval				0.1	0.5	%/V
Output pulse rise time	R_L = 10 MΩ,	C_L = 10 pF		20	75	ns
Output pulse fall time				15	60	
Maximum frequency in astable mode	R_A = 470 Ω, C_T = 200 pF,	R_B = 200 Ω, See Note 2	1.2	2.8		MHz

‡ Timing interval error is defined as the difference between the measured value and the nominal value of a random sample.
NOTE 2: R_A, R_B, and C_T are as defined in Figure 1.

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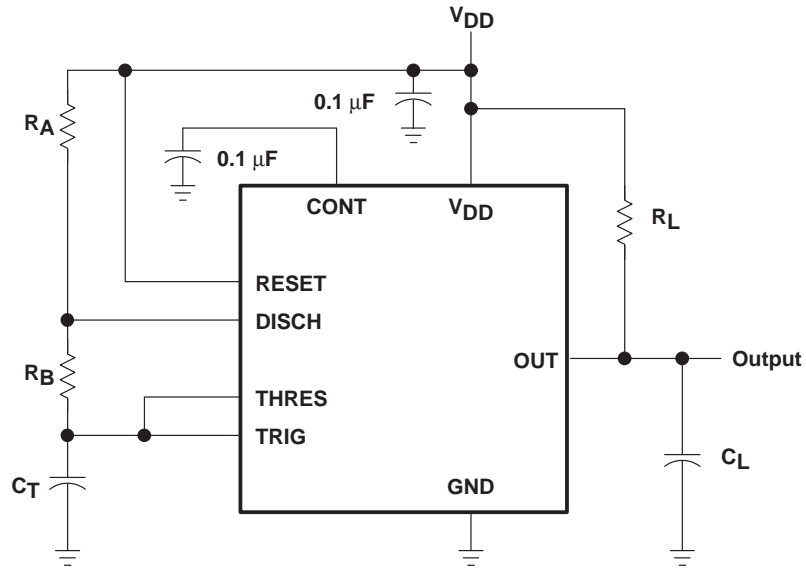
APPLICATION INFORMATION

Figure 1. Circuit for Astable Operation

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