

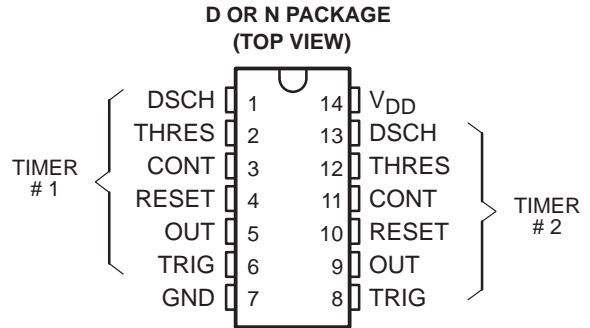
- **Very Low Power Consumption . . . 2 mW**  
Typ at  $V_{DD} = 5\text{ V}$
- **Capable of Operation in Astable Mode**
- **CMOS Output Capable of Swinging Rail to Rail**
- **High Output-Current Capability**  
Sink 100 mA Typ  
Source 10 mA Typ
- **Output Fully Compatible With CMOS, TTL, and MOS**
- **Low Supply Current Reduces Spikes During Output Transitions**
- **High-Impedance Inputs . . .  $10^{12}\ \Omega$  Typ**
- **Single-Supply Operation From 1 V to 18 V**
- **Functionally Interchangeable With the NE555; Has Same Pinout**

## description

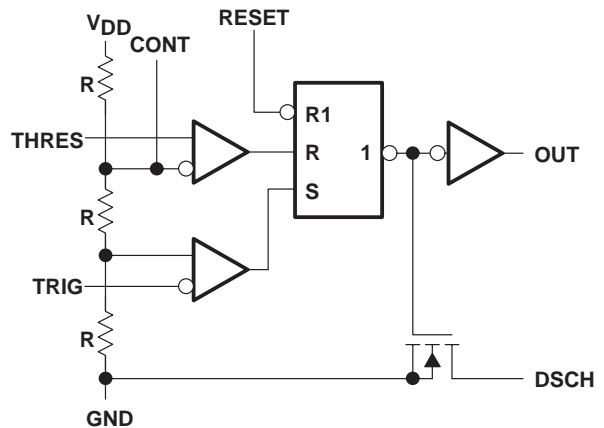
The TLC552 is a dual monolithic timing circuit fabricated using TI LinCMOS™ process, which provides full compatibility with CMOS, TTL, and MOS logic and operation at frequencies up to 2 MHz. Accurate time delays and oscillations are possible with smaller, less-expensive timing capacitors than the NE555 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.

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 NE555.



## 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).

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# TLC552C

## DUAL LINCMOS™ TIMER

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### 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



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

PARAMETER	TEST CONDITIONS	$T_A^\dagger$	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	$I_{OL} = 100\text{ }\mu\text{A}$	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	$I_{OL} = 100\text{ }\mu\text{A}$	25°C		0.03	0.2	V
		Full range			0.25	
High-level output voltage	$I_{OH} = -10\text{ }\mu\text{A}$	25°C	0.6	0.98		V
		Full range	0.6			
Supply current		25°C		30	200	$\mu\text{A}$
		Full range			300	

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

# TLC552C

## DUAL LINCMOS™ TIMER

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

PARAMETER	TEST CONDITIONS	$T_A^\dagger$	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	$I_{OL} = 1\text{ mA}$	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	$I_{OL} = 1\text{ mA}$	25°C		0.07	0.3	V
		Full range			0.35	
High-level output voltage	$I_{OH} = -300\text{ }\mu\text{A}$	25°C	1.5	1.9		V
		Full range	1.5			
Supply current		25°C		130	500	$\mu\text{A}$
		Full range			800	

$^\dagger$  Full range (MIN to MAX) is 0°C to 70°C.

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

PARAMETER	TEST CONDITIONS	$T_A^\dagger$	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	$I_{OL} = 10\text{ mA}$	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	$I_{OL} = 8\text{ mA}$	25°C		0.21	0.4	V
		Full range			0.5	
	$I_{OL} = 5\text{ mA}$	25°C		0.13	0.3	
		Full range			0.4	
	$I_{OL} = 3.2\text{ mA}$	25°C		0.08	0.3	
		Full range			0.35	
High-level output voltage	$I_{OH} = -1\text{ mA}$	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

SLFS046 – FEBRUARY 1984 – REVISED MAY 1988

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

PARAMETER	TEST CONDITIONS	T <sub>A</sub> †	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 <sub>OL</sub> = 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 <sub>OL</sub> = 100 mA	25°C	1.28 3.2			V
		Full range	3.6			
	I <sub>OL</sub> = 50 mA	25°C	0.63 1			
		Full range	1.3			
	I <sub>OL</sub> = 10 mA	25°C	0.12 0.3			
		Full range	0.4			
High-level output voltage	I <sub>OH</sub> = −10 mA	25°C	12.5	14.2	V	
		Full range	12.5			
	I <sub>OH</sub> = −5 mA	25°C	13.5	14.6		
		Full range	13.5			
	I <sub>OH</sub> = −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			

$^\dagger$  Full range (MIN to MAX) is 0°C to 70°C.

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

PARAMETER	TEST CONDITIONS	$T_A^\dagger$	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	$I_{OL} = 100\text{ mA}$	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	$I_{OL} = 3.2\text{ mA}$	25°C		0.04	0.3	V
		Full range			0.35	
High-level output voltage	$I_{OH} = -1\text{ mA}$	25°C	17.3	17.9		V
		Full range	17.3			
Supply current		25°C		0.84	1.2	mA
		Full range			1.6	

$^\dagger$  Full range (MIN to MAX) is 0°C to 70°C.

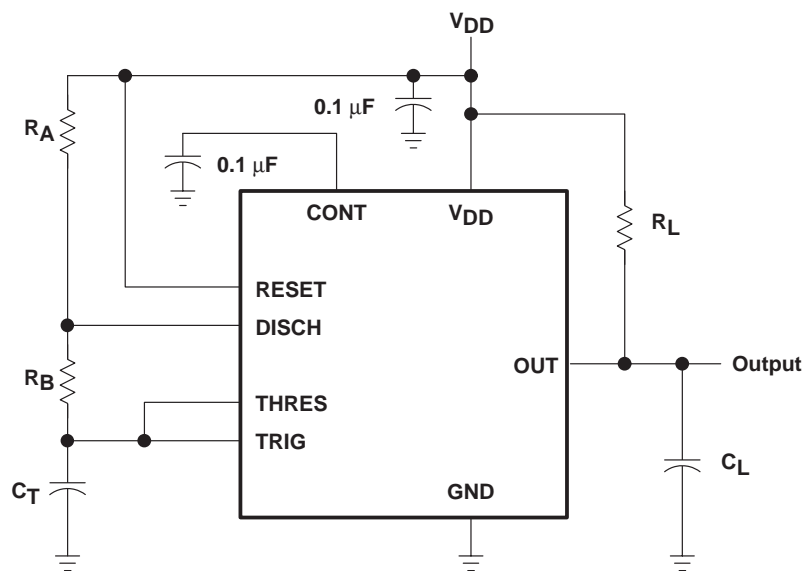
**operating characteristics,  $V_{DD} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$  (unless otherwise noted)**

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

$^\ddagger$  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.

## APPLICATION INFORMATION



**Figure 1. Circuit for Astable Operation**



## PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">TLC552CD</a>	Active	Production	SOIC (D)   14	50   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	TLC552C
TLC552CD.A	Active	Production	SOIC (D)   14	50   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	TLC552C
<a href="#">TLC552CDR</a>	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	TLC552C
TLC552CDR.A	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	TLC552C
<a href="#">TLC552CN</a>	Active	Production	PDIP (N)   14	25   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	TLC552CN
TLC552CN.A	Active	Production	PDIP (N)   14	25   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	TLC552CN

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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## TAPE AND REEL INFORMATION



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TLC552CDR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TLC552CDR	SOIC	D	14	2500	350.0	350.0	43.0

## TUBE



\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
TLC552CD	D	SOIC	14	50	505.46	6.76	3810	4
TLC552CD.A	D	SOIC	14	50	505.46	6.76	3810	4
TLC552CN	N	PDIP	14	25	506	13.97	11230	4.32
TLC552CN.A	N	PDIP	14	25	506	13.97	11230	4.32

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Last updated 10/2025