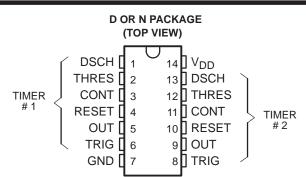
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- Very Low Power Consumption . . . 2 mW Typ at V<sub>DD</sub> = 5 V
- Capable of Operation in Astable Mode
- CMOS Output Capable of Swinging Rail to Rail
- High Output-Current Capability Sink 100 mA Typ Source 10 mA Typ
- Output Fully Compatible With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

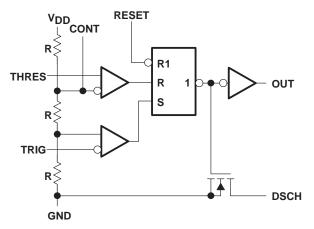
#### description

The TLC552 is a dual monolithic timing circuit fabricated using TI LinCMOS<sup>™</sup> 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



#### functional block diagram (each timer)



RESET can override TRIG and THRES. TRIG can override THRES.

#### **AVAILABLE OPTIONS**

SYMBC	LIZATION	OPERATING	
DEVICE	PACKAGE SUFFIX	TEMPERATURE RANGE	V <sub>T</sub> max at 25°C
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).

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 NE556.

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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.

		I UNUTION TABLE			
RESET VOLTAGE <sup>†</sup>	TRIGGER VOLTAGE <sup>†</sup>	THRESHOLD VOLTAGE <sup>†</sup>	OUTPUT	DISCHARGE SWITCH	
< MIN	Irrelevant	Irrelevant Lov		On	
> MAX	< MIN	Irrelevant	High	Off	
> MAX	> MAX	> MAX	Low	On	
> MAX	> MAX	< MIN	As previously established		

FUNCTION TABLE

<sup>†</sup> 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 <sub>DD</sub> (see Note 1)	
Input voltage range (any input)	-0.3 V to V <sub>DD</sub>
Sink current, DSCH or OUT	150 mĀ
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	

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

#### DISSIPATION RATING TABLE

PACKAGE	POWER RATING	DERATING FACTOR	ABOVE T <sub>A</sub>
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 <sub>DD</sub>	1	18	V
Operating free-air temperature range, T <sub>A</sub>	0	70	°C



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PARAMETER	TEST CONDITIONS	T <sub>A</sub> †	MIN	TYP	MAX	UNIT
Threshold voltage level		25°C	0.475	0.67	0.85	v
Threshold voltage level		Full range	0.45		0.875	v
Threshold current		25°C		10		pА
		MAX		75		рА
Trigger voltage level		25°C	0.15	0.33	0.425	V
		Full range	0.1		1.45	v
Trigger current		25°C		10		pА
nigger current		MAX		75		рА
Reset voltage level		25°C	0.4	0.7	1	V
Reset voltage level		Full range	0.3		1	v
Reset current		25°C		10		-
Reset current		MAX		75		рA
Control voltage (open-circuit) as a percentage of supply voltage		MAX		66.7%		
Discharge switch on-state voltage	I <sub>OL</sub> = 100 μA	25°C		0.02	0.15	v
Discharge switch on-state voltage	$IOL = 100 \mu A$	Full range			0.2	v
Discharge switch off-state current		25°C		0.1		nA
Discharge switch on-state current		MAX		0.5		ΠA
Low-level output voltage	100	25°C		0.03	0.2	v
	I <sub>OL</sub> = 100 μA	Full range			0.25	v
High-level output voltage	10.1.4	25°C	0.6	0.98		V
	I <sub>OH</sub> = −10 μA	Full range	0.6			V
Supply ourront		25°C		30	200	
Supply current		Full range			300	μA

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

<sup>†</sup>Full range (MIN to MAX) is 0°C to 70°C.



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

PARAMETER	TEST CONDITIONS	T <sub>A</sub> †	MIN	TYP	MAX	UNIT
		25°C	0.95	1.33	1.65	V
Threshold voltage level		Full range	0.85		1.75	v
Threshold current		25°C		10		~ ^
Theshold current		MAX		75		pА
Trigger voltage level		25°C	0.4	0.67	0.95	V
Trigger voltage level		Full range	0.3		1.05	v
Trigger current		25°C		10		pА
		MAX		75		рд
Reset voltage level		25°C	0.4	1.1	1.5	V
Ineset voltage level		Full range	0.3		1.8	v
Reset current		25°C		10		n۸
Reset current		MAX		75		рА
Control voltage (open-circuit) as a percentage of supply voltage		MAX		66.7%		
Discharge switch on-state voltage	$lot = 1 m \Lambda$	25°C		0.03	0.2	V
Discharge switch on-state voltage	I <sub>OL</sub> = 1 mA	Full range			0.25	v
Discharge switch off-state current		25°C		0.1		nA
Discharge switch on-state current		MAX		0.5		ПА
Low-level output voltage	$I_{OI} = 1 \text{ mA}$	25°C		0.07	0.3	V
	IOL = 1 IIIX	Full range			0.35	v
High-level output voltage	I <sub>OH</sub> = -300 μA	25°C	1.5	1.9		v
		Full range	1.5			v
Supply current		25°C		130	500	μA
Supply current		Full range			800	μΑ

<sup>†</sup>Full range (MIN to MAX) is 0°C to 70°C.



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PARAMETER	TEST CONDITIONS	T <sub>A</sub> †	MIN	TYP	MAX	UNIT	
Threshold voltage level		25°C	2.8	3.3	3.8	V	
Threshold voltage level	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	3.9	v				
Threshold current		25°C		10		pА	
	$\begin{array}{c c c c c c c c } & 25^{\circ}\cent{Gamma} \\ \hline Full range \\ 25^{\circ}\cent{Gamma} \\ \hline MAX \\ 25^{\circ}\cent{Gamma} \\ \hline Full range \\ 25^{\circ}\cent{Gamma} \\ \hline \\ $		75		рА		
Trigger voltage level		25°C	1.36	1.66	1.96	V	
Trigger voltage level		Full range	1.26		2.06	v	
Trigger current		25°C		10		pА	
nigger current		MAX		75		РА	
Reset voltage level		25°C	0.4	1.1	1.5	V	
Reset voltage level		Full range	0.3		1.8	v	
Reset current		25°C		10		n۸	
Reset current		MAX		75		рA	
Control voltage (open-circuit) as a percentage of supply voltage		MAX		66.7%			
Discharge switch on-state voltage	lot = 10  mA	25°C		0.14	0.5	V	
Discharge switch on-state voltage	OC = 10 MA	Full range			0.6	v	
Discharge switch off-state current		25°C		0.1		nA	
Discharge switch on-state current		MAX		0.5		IIA	
		25°C		0.21	0.4		
		Full range			0.5		
Low-level output voltage		25°C		0.13	0.3	V	
Low-level output voltage	IOL = 2 IIIA	Full range			0.4	v	
	$101 - 32 m^{1}$	25°C		0.08	0.3		
	IUL = 3.2 IIIA	Full range			0.35		
High-level output voltage		25°C	4.1	4.8		V	
		Full range	4.1			v	
Supply surront		25°C		340	700	μA	
Supply current		Full range			1000	μA	

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

<sup>†</sup> Full range (MIN to MAX) is 0°C to 70°C.



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

PARAMETER	TEST CONDITIONS	T <sub>A</sub> †	MIN	TYP	MAX	UNIT
		25°C	9.45	10	10.55	V
Threshold voltage level		Full range	9.35		10.65	V
		25°C		10		~ ^
Threshold current		MAX		75		рА
Trigger voltage level		25°C	4.65	5	5.35	V
		Full range	4.55		5.45	V
Trigger current		25°C		10		pА
nigger current		MAX		75		рА
Reset voltage level		25°C	0.4	1.1	1.5	V
Neser voltage level		Full range	0.3		1.8	v
Reset current		25°C		10		pА
		MAX		75		рл
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
Discharge switch on-state voltage		Full range			1.8	v
Discharge switch off-state current		25°C		0.1		nA
		MAX	4.65 5   4.55 10   75 0.4   0.3 10   75 66.7%   0.77 0.1   0.1 0.5   1.28 0.63   0.12 0.12   12.5 14.2   13.5 14.6	0.5		IIA
	I <sub>OL</sub> = 100 mA	25°C		1.28	3.2	
		Full range			3.6	
ontrol voltage (open-circuit) as a percentage of supply voltage scharge switch on-state voltage scharge switch off-state current	I <sub>OL</sub> = 50 mA	25°C		0.63	1	v
	IOL = 30 IIIA	Full range			1.3	v
	I <sub>OL</sub> = 10 mA	25°C		0.12	0.3	
	OC = 10 MA	Full range		10 10 75 5 10 75 1.1 10 75 66.7% 0.77 0.1 0.5 1.28 0.63	0.4	
	I <sub>OH</sub> = -10 mA	25°C	12.5	14.2		
	IOH = = 10 IIIX	Full range	12.5			
High-level output voltage		25°C	13.5	14.6		V
nightevel output voltage	$I_{OH} = -5 \text{ mA}$	Full range	13.5			
	1011- 1 mA	25°C	14.2	14.9		
	I <sub>OH</sub> = -1 mA	Full range	14.2			
Supply current		25°C		0.72	1.2	mA
Зарру санена		Full range			1.6	IIIA

<sup>†</sup> Full range (MIN to MAX) is 0°C to 70°C.



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PARAMETER	TEST CONDITIONS	T <sub>A</sub> †	MIN	TYP	MAX	UNIT
Threshold voltage level		25°C	11.4	12	12.6	V
Threshold voltage level		Full range	10.9		12.7	v
Threshold current		25°C		10		
		MAX		75		рА
Trigger voltage level		25°C	5.6	6	6.4	V
rigger voltage lever		Full range	5.5		6.5	v
Trigger current		25°C		10		pА
ringger current		MAX		75		рА
Reset voltage level		25°C	0.4	1.1	1.5	V
Reset voltage level		Full range	0.3		1.8	v
Reset current		25°C		10		рА
Reset current				75	РА	
Control voltage (open-circuit) as a percentage of supply voltage		MAX		66.7%		
Discharge switch on state voltage	la: 100 mA	25°C		0.72	1.5	V
Discharge switch on-state voltage	I <sub>OL</sub> = 100 mA	Full range			1.6	V
Discharge switch off state surrout		25°C		0.1		nA
Discharge switch off-state current		MAX		0.5		nA
		25°C		0.04	0.3	V
Low-level output voltage	I <sub>OL</sub> = 3.2 mA	Full range			0.35	v
High level output voltage	1011- 1 mA	25°C	17.3	17.9		V
High-level output voltage	$I_{OH} = -1 \text{ mA}$	Full range	17.3			V
Supply ourrent		25°C		0.84	1.2	
Supply current					1.6	mA

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

<sup>†</sup> Full range (MIN to MAX) is 0°C to 70°C.

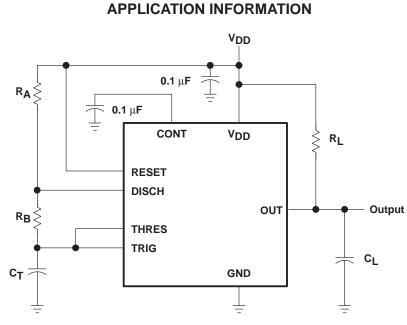
## operating characteristics, $V_{DD}$ = 5 V, $T_A$ = 25°C (unless otherwise noted)

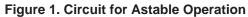
PARAMETER	TEST	TEST CONDITIONS			MAX	UNIT
Initial error of timing interval‡	$V_{DD} = 5 V \text{ to } 15 V,$	$R_A = R_B = 1 \ k\Omega$ to 100 $k\Omega$ ,		1%	3%	
Supply voltage sensitivity of timing interval	C <sub>T</sub> = 0.1 μF,	See Note 2		0.1	0.5	%/V
Output pulse rise time	D. 10 MO	C. 10 pF		20	75	
Output pulse fall time	$R_{L} = 10 \ M\Omega,$	C <sub>L</sub> = 10 pF		15	60	ns
Maximum frequency in astable mode	R <sub>A</sub> = 470 Ω, C <sub>T</sub> = 200 pF,	$R_B = 200 \Omega$ , See Note 2	1.2	2.8		MHz

<sup>‡</sup> Timing interval error is defined as the difference between the measured value and the nominal value of a random sample. NOTE 2: R<sub>A</sub>, R<sub>B</sub>, and C<sub>T</sub> are as defined in Figure 1.



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#### **PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
TLC552CD	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
TLC552CDG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
TLC552CDR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
TLC552CDRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
TLC552CN	ACTIVE	PDIP	Ν	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
TLC552CNE4	ACTIVE	PDIP	Ν	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	

<sup>(1)</sup> The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

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<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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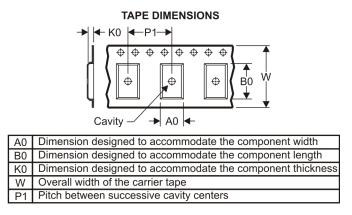
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### TAPE AND REEL INFORMATION





#### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All	dimensions	are	nominal
------	------------	-----	---------

Device	Package Type	Package Drawing			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



# PACKAGE MATERIALS INFORMATION

11-Mar-2008



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TLC552CDR	SOIC	D	14	2500	346.0	346.0	33.0

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DLP® Products	www.dlp.com	Energy and Lighting	www.ti.com/energy
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