

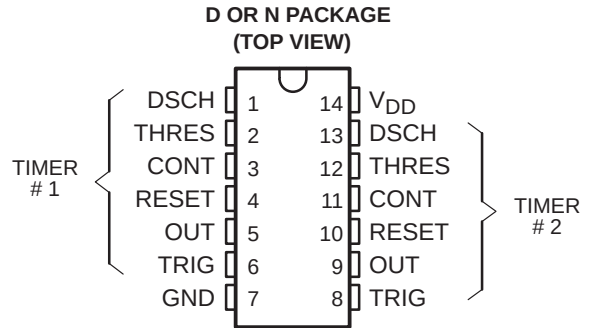
- Very Low Power Consumption . . . 2 mW
Typ at $V_{DD} = 5\text{ V}$
- Capable of Operation in Astable Mode
- CMOS Output Capable of Swinging Rail to Rail
- High Output-Current Capability
Sink 100 mA Typ
Source 10 mA Typ
- Output Fully Compatible With CMOS, TTL,
and MOS
- Low Supply Current Reduces Spikes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

description

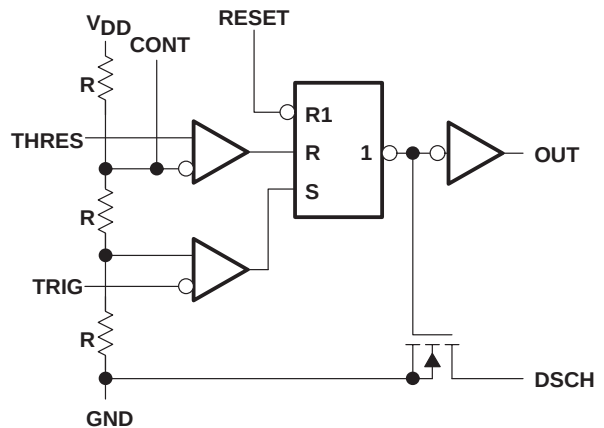
The TLC552 is a dual monolithic timing circuit fabricated using TI LinCMOS™ process, which provides full compatibility with CMOS, TTL, and MOS logic and operation at frequencies up to 2 MHz. Accurate time delays and oscillations are possible with smaller, less-expensive timing capacitors than the NE555 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 NE556.



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).

LinCMOS is a trademark of Texas Instruments Incorporated.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



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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 [†]	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.

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	μA
		Full range			800	

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

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

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

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

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, $V_{DD} = 18\text{ V}$

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	

† 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 ‡	$V_{DD} = 5\text{ V to }15\text{ V}$, $C_T = 0.1\text{ }\mu\text{F}$, $R_A = R_B = 1\text{ k}\Omega\text{ to }100\text{ k}\Omega$, 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

‡ 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

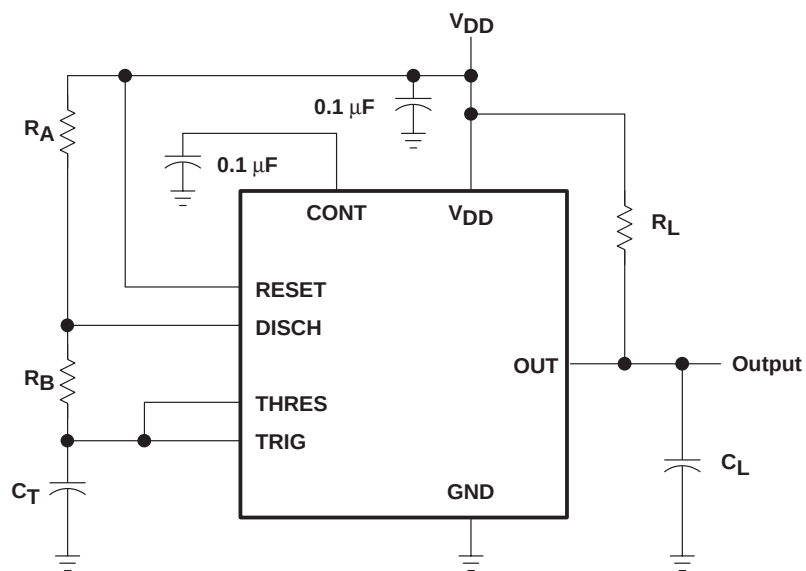


Figure 1. Circuit for Astable Operation

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	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	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
TLC552CNE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	

⁽¹⁾ 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.

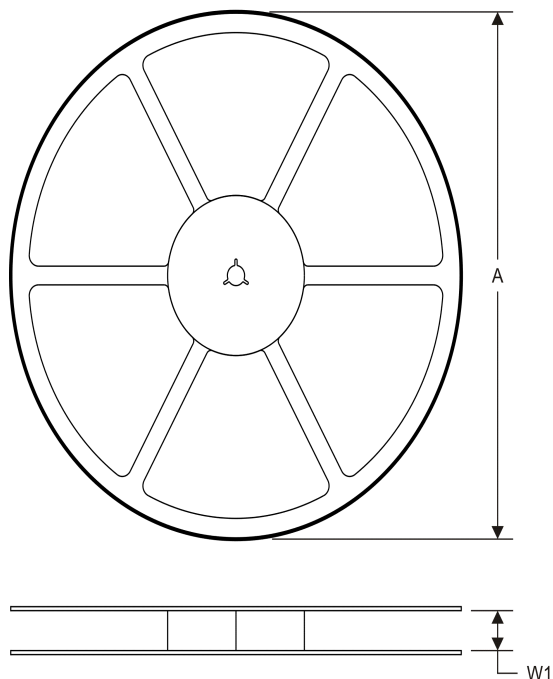
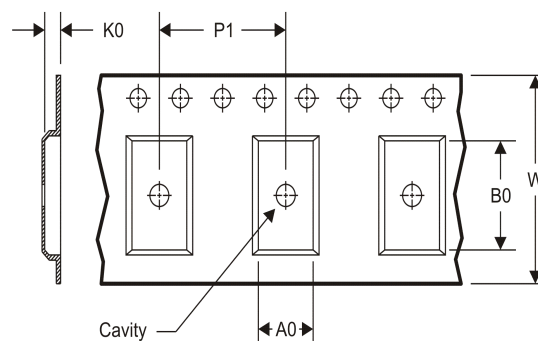
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

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TAPE AND REEL INFORMATION
REEL DIMENSIONS

TAPE DIMENSIONS


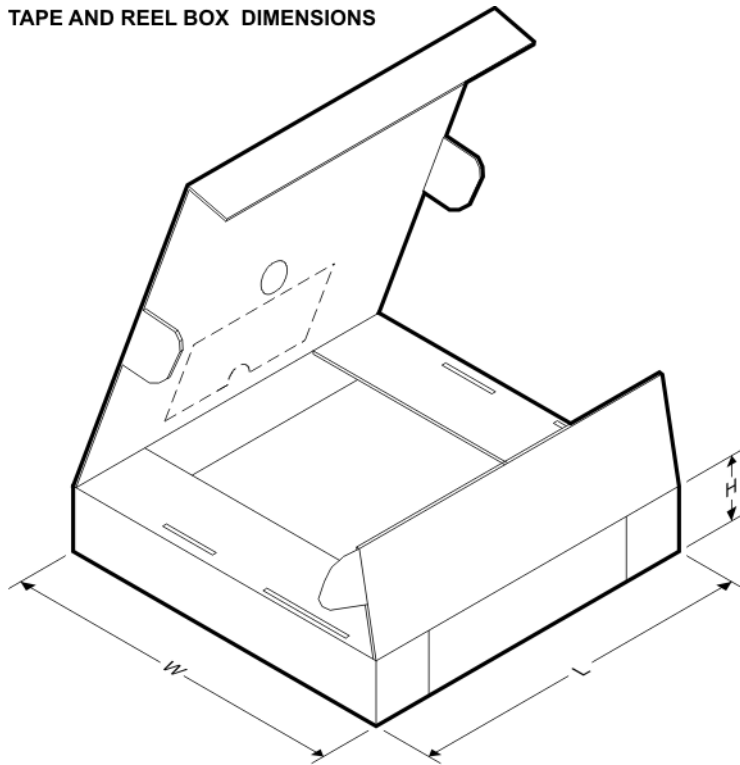
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

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	367.0	367.0	38.0

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