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<ul> <li>Designed for Use With the TL852 in Sonar Ranging Modules Like the SN28827</li> </ul>	N PACKAGE (TOP VIEW)				
Operates With Single Supply					
<ul> <li>Accurate Clock Output for External Use</li> </ul>					
<ul> <li>Synchronous 4-Bit Gain Control Output</li> </ul>	GND 🛛 3 14 🗍 INIT				
<ul> <li>Internal 1.2-V Level Detector for Receive</li> </ul>					
TTL-Compatible	GCA 🛛 5 12 🗍 XTAL2				
<ul> <li>Interfaces to Electrostatic or Piezoelectric</li> </ul>	GCB <b>[</b> 6 11 <b>]</b> XTAL1				
Transducers	GCC [] 7 10 [] OSC				
Transducers	REC 8 9 ECHO				
description	1T				

#### description

The TL851 is an economical digital I<sup>2</sup>L ranging control integrated circuit designed for use with the Texas Instruments TL852 sonar ranging receiver integrated circuit.

The TL851 is designed for distance measurement from six inches to 35 feet. The device has an internal oscillator that uses a low-cost external ceramic resonator. With a simple interface and a 420-kHz ceramic resonator, the device will drive a 50-kHz electrostatic transducer.

The device cycle begins when Initiate (INIT) is taken to the high logic level. There must be at least 5 ms from initial power-up ( $V_{CC}$ ) to the first initiate signal in order for all the device internal latches to reset and for the ceramic-resonator-controlled oscillator to stabilize. The device will transmit a burst of 16 pulses each time INIT is taken high.

The oscillator output (OSC) is enabled by INIT. The oscillator frequency is the ceramic resonator frequency divided by 8.5 for the first 16 cycles (during transmit) and then the oscillator frequency changes to the ceramic resonator frequency divided by 4.5 for the remainder of the device cycle.

When used with an external 420-kHz ceramic resonator, the device internal blanking disables the receive input (REC) for 3.8 ms after initiate to exclude false receive inputs that may be caused by transducer ringing. The internal blanking feature also eliminates echos from objects closer than 1.3 feet from the transducer. If it is necessary to detect objects closer than 1.3 feet, then the internal blanking may be shortened by taking the blanking inhibit (BINH) high, enabling the receive input. The blanking input (BLNK) may be used to disable the receive input and reset ECHO to a low logic level at any time during the device cycle for selective echo exclusion or for a multiple-echo mode of operation.

The device provides a synchronous 4-bit gain control output (12 steps) designed to control the gain of the TL852 sonar ranging receiver integrated circuit. The digital gain control waveforms are shown in Figure 2 with the nominal transition times from INIT listed in the Gain Control Output Table.

The threshold of the internal receive level detector is 1.2 V. The TL851 operates over a supply voltage range of 4.5 V to 6.8 V and is characterized for operation from 0°C to 40°C.

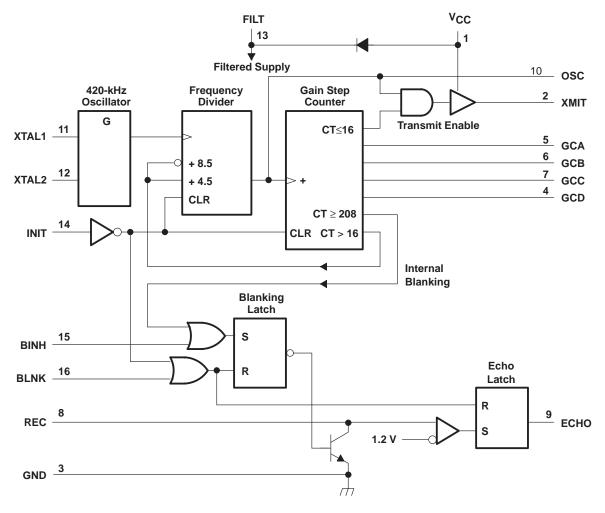


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	GAIN CONTROL OUTPUT TABLE											
STEP NUMBER	GCD	GCD GCC GCB GCA		TIME (ms) FROM INITIATE↑†								
0	L	L	L	L	2.38 ms							
1	L	L	L	Н	5.12 ms							
2	L	L	L	L	7.87 ms							
3	L	L	Н	Н	10.61 ms							
4	L	Н	L	L	13.35 ms							
5	L	Н	L	Н	16.09 ms							
6	L	Н	Н	L	18.84 ms							
7	L	Н	Н	Н	21.58 ms							
8	н	L	L	L	27.07 ms							
9	н	L	L	Н	32.55 ms							
10	н	L	Н	L	38.04 ms							
11	н	L	Н	Н	$INIT\downarrow$							

<sup>†</sup> This is the time to the end of the indicated step and assumes a nominal 420-kHz ceramic resonator.

### functional block diagram





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#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

Voltage range at any pin with respect to GND
Voltage range at any pin with respect to V <sub>CC</sub>
Continuous total dissipation at (or below) 25°C free-air temperature (see Note 1)
Operating free-air temperature range
Storage temperature range – 65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds

<sup>†</sup> Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other conditions beyond those indicated in the recommended operating conditions section of this specification is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. NOTE 1: For operation above 25°C, derate linearly at the rate of 9.2 mW/°C.

#### recommended operating conditions

		MIN	MAX	UNIT
Supply voltage, V <sub>CC</sub>		4.5	6.8	V
High-level input voltage, VIH	BLNK, BINH, INIT	2.1		V
Low-level input voltage, VIL	BLNK, BINH, INIT		0.6	V
Delay time, power up to INIT high		5		ms
Operating free-air temperature, $T_A$		0	40	°C

#### electrical characteristics over recommended ranges of supply voltage and operating free-air temperature

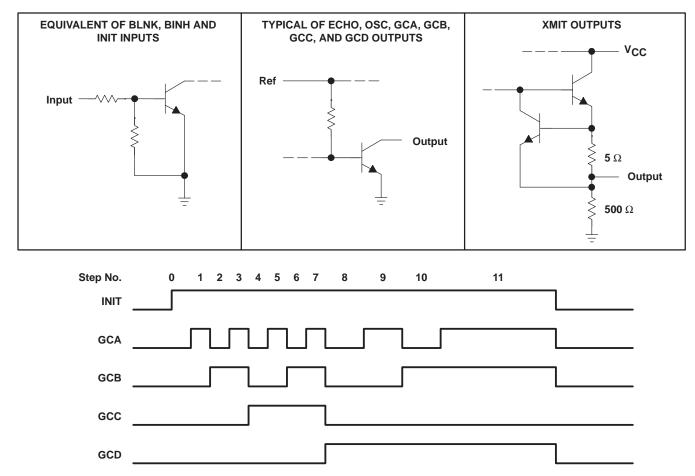
	PARAME	TER	TEST CONDITIONS	MIN T	YP‡	MAX	UNIT
Input current		BLNK, BINH, INIT	V <sub>I</sub> = 2.1 V			1	mA
High-level output curre	ent, IOH	ECHO, OSC, GCA, GCB, GCC, GCD	V <sub>OH</sub> = 5.5 V			100	μΑ
Low-level output curren	nt, I <sub>OH</sub>	ECHO, OSC, GCA, GCB, GCC, GCD	I <sub>OL</sub> = 1.6 mA			0.4	V
On-state output current		SMIT output	V <sub>O</sub> = 1 V	-	-140		mA
Internal blanking interv	al	REC input		2	.38§		ms
	ulas transmit pariod	OSC output		4	9.4§		kHz
Frequency during 16-p	uise transmit period	XMIT output		4	9.4§		KHZ
Frequency after 16-pul	as transmit pariod	OSC output		9:	3.3§		kHz
Frequency alter To-put	se transmit period	XMIT output	(		0		KITZ
Supply current, ICC	During transmit peri	od				260	mA
	After transmit period	3				55	ША

<sup>‡</sup> Typical values are at V<sub>CC</sub> = 5 V and T<sub>A</sub> = 25°C. § These typical values apply for a 420-kHz ceramic resonator.



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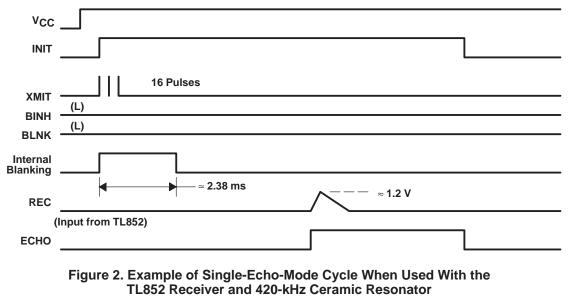
#### schematics of inputs and outputs







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## PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
	(.)		•		-	(-)	(6)	(-)		()	
TL851CD	ACTIVE	SOIC	D	16	40	RoHS & Green	NIPDAU	Level-1-260C-UNLIM		TL851C	Samples
TL851CDR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM		TL851C	Samples
TL851CDR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM		TL851C	Samples
TL851CN	ACTIVE	PDIP	Ν	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type		TL851CN	Samples
TL851CN	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type		TL851CN	Samples
TL851CNE4	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type		TL851CN	Samples
TL851CNE4	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type		TL851CN	Samples

<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.

<sup>(2)</sup> RoHS: TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (CI) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

<sup>(4)</sup> There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.



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# PACKAGE OPTION ADDENDUM

<sup>(6)</sup> Lead finish/Ball material - Orderable Devices 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.

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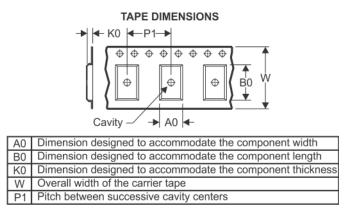
# PACKAGE MATERIALS INFORMATION

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## TAPE AND REEL INFORMATION





## QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All	dimensions	are	nominal
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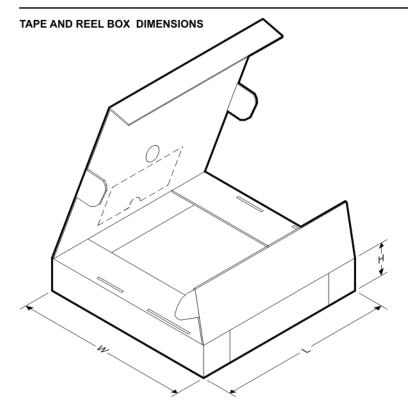
Device	•	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	· /	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TL851CDR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1



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# PACKAGE MATERIALS INFORMATION

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\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TL851CDR	SOIC	D	16	2500	350.0	350.0	43.0



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## TUBE



#### \*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	Τ (μm)	B (mm)
TL851CD	D	SOIC	16	40	505.46	6.76	3810	4
TL851CN	N	PDIP	16	25	506	13.97	11230	4.32
TL851CNE4	Ν	PDIP	16	25	506	13.97	11230	4.32

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



NOTES: A. All linear dimensions are in inches (millimeters).

- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.



# N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



NOTES:

- A. All linear dimensions are in inches (millimeters).B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- $\triangle$  The 20 pin end lead shoulder width is a vendor option, either half or full width.



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