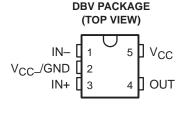
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- Single Supply or Dual Supplies
- Wide Range of Supply Voltage ... 2 V to 36 V
- Low Supply-Current Drain Independent of Supply Voltage . . . 0.4 mA Typ
- Low Input Bias Current . . . 25 nA Typ
- Low Input Offset Voltage . . . 2 mV Typ
- Common-Mode Input Voltage Range Includes Ground
- Differential Input Voltage Range Equal to Maximum-Rated Supply Voltage . . . ±36 V
- Low Output Saturation Voltage
- Output Compatible With TTL, MOS, and CMOS
- Packaged in Plastic Small-Outline Transistor Package



description

This device consists of a single voltage comparator that is designed to operate from a single power supply over a wide range of voltages. Operation from dual supplies also is possible if the difference between the two supplies is 2 V to 36 V and V_{CC} is at least 1.5 V more positive than the input common-mode voltage. Current drain is independent of the supply voltage. The output can be connected to other open-collector outputs to achieve wired-AND relationships.

The TL331I is characterized for operation from –40°C to 85°C.

logic diagram



AVAILABLE OPTIONS

		PACKAGED DEVICE			
TA	V _{IO(max}) AT 25°C	SMALL-OUTLINE TRANSISTOR (DBV)			
-40°C to 85°C	5 mV	TL331IDBV			

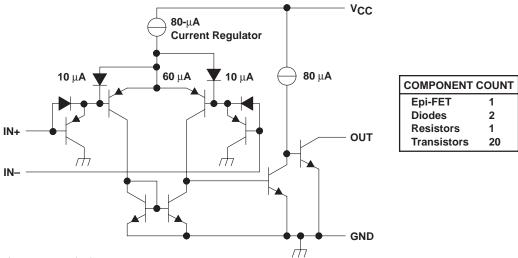
The DBV package is only available left-end taped and reeled. Add suffix R to device type (e.g., TL331IDBVR).



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schematic



Current values shown are nominal.

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

Supply voltage, V _{CC} (see Note 1)	36 V
Differential input voltage, V _{ID} (see Note 2)	
Input voltage range, V _I (either input)	0.3 V to 36 V
Output voltage, VO	
Output current, IO	
Duration of output short-circuit to ground (see Note 3)	Unlimited
Package thermal impedance, θ _{JA} (see Notes 4 and 5)	347°C/W
Operating free-air temperature range, T _A	–40°C to 85°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C
Storage temperature range, T _{stq}	−65°C to 150°C

[†] Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. All voltage values, except differential voltages, are with respect to the network ground.
 - 2. Differential voltages are at IN+ with respect to IN-.
 - 3. Short circuits from outputs to $V_{\hbox{CC}}$ can cause excessive heating and eventual destruction.
 - 4. Maximum power dissipation is a function of $T_J(max)$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can impact reliability.
 - 5. The package thermal impedance is calculated in accordance with JESD 51.



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electrical characteristics at specified free-air temperature, $V_{CC} = 5 \text{ V}$ (unless otherwise noted)

	PARAMETER	TEST (CONDITIONS	T _A †	MIN	TYP	MAX	UNIT	
V _{IO} Input offset voltage		$V_{CC} = 5 \text{ V to } 30 \text{ V}, V_{O} = 1.4 \text{ V},$		25°C		2	5	mV	
VIO	input onset voltage	VIC = VIC(min)		–40°C to 85°C			9	IIIV	
lio.	Input offset current	V _O = 1.4 V		25°C		5	50	nA	
110	input onset current			–40°C to 85°C			250		
l.s	Input bias current	V _O = 1.4 V		25°C		-25	-250	nA	
IB	input bias current			–40°C to 85°C			-400		
V	Common-mode			25°C	0 to V _{CC} -1.5			٧	
VICR	input voltage range‡			-40°C to 85°C	0 to V _{CC} -2				
AVD	Large-signal differential voltage amplification	$V_{CC} = 15 \text{ V}, V_{O}$ $R_{L} \ge 15 \text{ k}\Omega \text{ to } V_{O}$	= 1.4 V to 11.4 V,	25°C	50	200		V/mV	
lau	High lovel output ourrent	V _{OH} = 5 V,	V _{ID} = 1 V	25°C		0.1	50	nA	
ЮН	High-level output current	V _{OH} = 30 V,	V _{ID} = 1 V	–40°C to 85°C			1	μΑ	
Vai	V- Low level output voltage	l 4 m Λ	V 1 V	25°C		150	400	mV	
VOL	Low-level output voltage	$I_{OL} = 4 \text{ mA},$	$V_{ID} = -1 V$	–40°C to 85°C			700	1117	
l _{OL}	Low-level output current	$V_{OL} = 1.5 V,$	V _{ID} = 1 V	25°C	6			mA	
Icc	Supply current	R _L = ∞,	$V_{CC} = 5 V$	25°C		0.4	0.7	mA	

[†] All characteristics are measured with zero common-mode input voltage, unless otherwise specified.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER	TEST CO	MIN	TYP	MAX	UNIT	
Response time R _L connected to 5 V through 5 C _L = 15 pF\$, See Note 6	R _L connected to 5 V through 5.1 k Ω ,	100-mV input step with 5-mV overdrive	1.3 0.3			μs
	C _L = 15 pF§, See Note 6	TTL-level input step				

§ C_L includes probe and jig capacitance.

NOTE 6: The response time specified is the interval between the input step function and the instant when the output crosses 1.4 V.



 $^{^{\}ddagger}$ The voltage at either input or common-mode should not be allowed to go negative by more than 0.3 V. The upper end of the common-mode voltage range is $V_{CC+} - 1.5$ V, but either or both inputs can go to 30 V without damage.

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TL331, Single Differential Comparator

DEVICE STATUS: ACTIVE

PARAMETER NAME	TL331
IQ per channel (max) (mA)	0.7
Output Current (min) (mA)	6
tRESP Low - to - High (us)	0.3
Vs (max) (V)	36
Vs (min) (V)	2
VICR (min) (V)	8
VIO (25 deg C) (max) (mV)	5
Rail-Rail	No
Output Type	Open Drain/Collector
Number of Channels	1

FEATURES<u>▲Back to Top</u>

- Single Supply or Dual Supplies
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DESCRIPTION<u>■Back to Top</u>

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TECHNICAL RESOURCES

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To download a document to your hard drive, right-click on the link and choose 'Save'.

DATASHEET ABack to Top

APPLICATION NOTES Back to Top

• AB-172: Current Feedback Amplifiers: Review, Stability Analysis, and Applications (SBOA081 - Updated: 11/20/2000)

• Analysis of the Sallen-Key Architecture (Rev. A) (SLOA024A - Updated: 07/27/1999)

RELATED DOCUMENTS

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- Military Analog Selection Guide (SGLB002, 318 KB Updated: 11/09/2000)
- Military Semiconductors Selection Guide 2002 (Rev. B) (SGYC003B, 1648 KB Updated: 04/22/2002)

SAMPLES	<u> ■Back to Top</u>				
ORDERABLE DEVICE	<u>PACKAGE</u>	<u>PINS</u>	TEMP (°C)	STATUS	<u>SAMPLES</u>
TL331IDBVR	<u>DBV</u>	5	-40 TO 85	ACTIVE	<u>Request Samples</u>

PRICING/AVAILABII	LITY/PKG					<u> ▲Back to Top</u>			
ORDERABLE DEVICE	PACKAGE	<u>PINS</u>	TEMP (°C)	<u>STATUS</u>	BUDGETARY PRICE US\$/UNIT QTY=1000+	PACK QTY	PRICING/AVAILABILITY/PKG		
TL331CD	<u>D</u>	8		OBSOLETE					
TL331IDBVR	<u>DBV</u>	5	-40 TO 85	ACTIVE	0.28	3000	<u>Check stock or order</u>		
TL331IDR	<u>D</u>	8		OBSOLETE					
TL331IP	<u>P</u>	8		OBSOLETE					

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