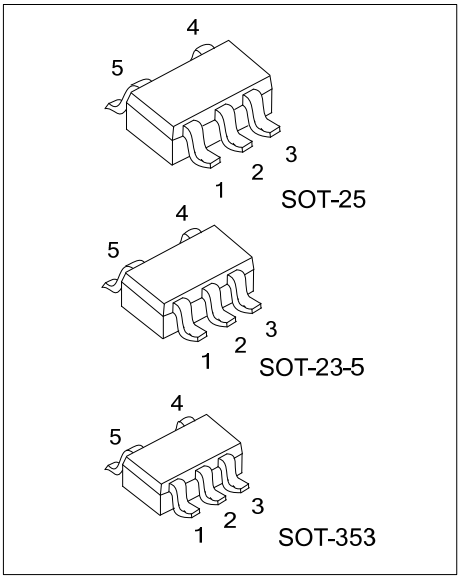
UTL331/A

LINEAR INTEGRATED CIRCUIT

LOW POWER SINGLE VOLTAGE COMPARATOR



■ DESCRIPTION

The UTC **UTL331/A** consists of a low power voltage comparator designed specifically for operation from a single supply over a wide range of voltages. Operation from split power supplies is also possible.

This comparator also has a unique characteristic that the input common-mode voltage range includes ground even though it is operated from a single power supply voltage.

■ FEATURES

* Wide single supply voltage range or dual supplies +2V~+36V or ±1V~±18V
* Very low supply current (0.4mA) independent of supply voltage (2mW /comparator at +5V)
* Low input bias current: 25nA typ.
* Low input offset current: ±5nA typ.
* Low input offset voltage: ±1mV typ
* Input common-mode voltage range includes ground.
* Low output saturation voltage: 250mV typ.(I_{OUT}=4mA).
* Differential input voltage range equal to the supply voltage.
*TTL, DTL, ECL, CMOS Compatible outputs.

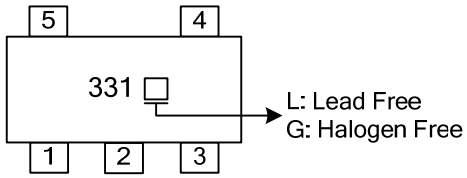
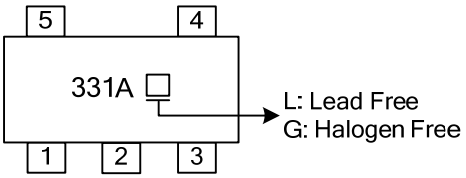
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UTL331L-AF5-R	UTL331G-AF5-R	SOT-25	Tape Reel
UTL331AL-AF5-R	UTL331AG-AF5-R	SOT-25	Tape Reel
UTL331L-AE5-R	UTL331G-AE5-R	SOT-23-5	Tape Reel
UTL331AL-AE5-R	UTL331AG-AE5-R	SOT-23-5	Tape Reel
UTL331L-AL5-R	UTL331G-AL5-R	SOT-353	Tape Reel
UTL331AL-AL5-R	UTL331AG-AL5-R	SOT-353	Tape Reel

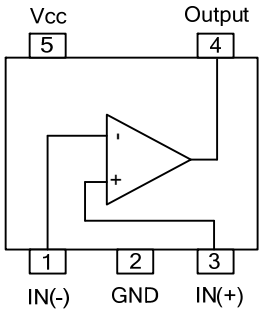
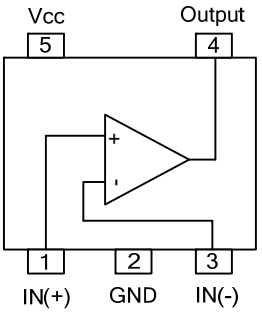
UTL331L-AF5-R (1)Packing Type (2)Package Type (3)Lead Free	(1) R: Tape Reel (2) AF5: SOT-25, AE5: SOT-23-5, AL5: SOT-353 (3) L: Lead Free, G: Halogen Free

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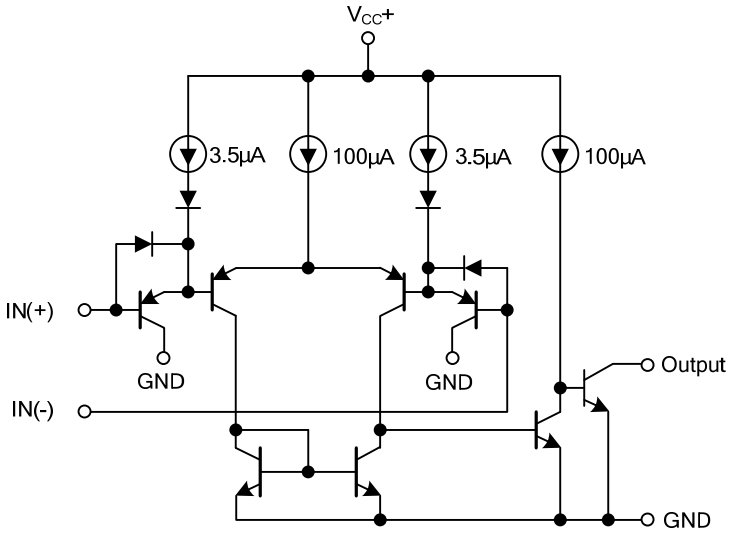
■ MARKING

UTL331	UTL331A
	

■ PIN CONNECTIONS (top view)

UTL331	UTL331A
	

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	±18 or 36	V
Differential Input Voltage		$V_{I(DIFF)}$	±36	V
Input Voltage		V_{IN}	-0.3 ~ +36	V
Output Short-Circuit to Ground (Note 2)			Infinite	
Power Dissipation	SOT-25	P_D	360	mW
	SOT-23-5		300	mW
	SOT-353		250	mW
Junction Temperature		T_J	150	°C
Operating Temperature		T_{OPR}	-40 ~ +125	°C
Storage Temperature		T_{STG}	-65 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Short-circuit from the output to V_{CC} can cause excessive heating and eventual destruction. The maximum output current is approximately 20mA, independent of the magnitude of V_{CC}.

■ THARMAL DATA (T_J=150°C, T_A=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATING	UNIT
junction to Ambient	SOT-25	θ_{JA}	230	°C/W
	SOT-23-5		280	°C/W
	SOT-353		350	°C/W

■ ELECTRICAL CHARACTERISTICS

(V_{CC}=5.0V, All voltage referenced to GND, T_A=25°C, unless otherwise specified)

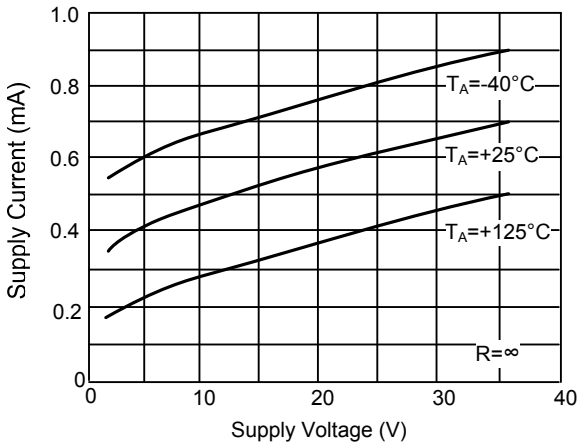
PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Input Offset Voltage (Note 1)	$V_{I(OFF)}$	T_A=+25°C			1	5	mV
		$T_{MIN} \le T_A \le T_{MAX}$				9	mV
Differential Input Voltage	$V_{I(DIFF)}$	(Note 4)				V_{CC}	V
Large Signal Voltage Gain	Gv	V_{CC}=15V, R_L=15k, V_{OUT}=1~ 11V		50	200		V/mV
Input Common Mode Voltage Range (Note 3)	$V_{I(CM)}$	T_A=+25°C		0		V_{CC}-1.5	V
		$T_{MIN} \le T_A \le T_{MAX}$		0		V_{CC} -2	V
Low Level Output Voltage	V_{OL}	$V_{I(DIFF)}$=1V,	T_A=+25°C		250	400	mV
		V_{CC}= V_{OUT} =30V	$T_{MIN} \le T_A \le T_{MAX}$			700	mV
Input Bias Current (Note 2)	$I_{I(BIAS)}$	T_A=+25°C			25	250	nA
		$T_{MIN} \le T_A \le T_{MAX}$				400	nA
Input Offset Current	$I_{I(OFF)}$	T_A=+25°C			5	50	nA
		$T_{MIN} \le T_A \le T_{MAX}$				150	nA
Supply Current	I_{CC}	V_{CC}=5V, no load			0.4	0.7	mA
		V_{CC}=36V, no load			0.7	0.9	mA
Output Sink Current	I_{SINK}	$V_{I(DIFF)}$=-1V, V_{OUT} =1.5V		6	16		mA
High Level Output Current	I_{OH}	$V_{I(DIFF)}$=1V,	T_A=+25°C		0.1	50	nA
		V_{CC}= V_{OUT} =30V	$T_{MIN} \le T_A \le T_{MAX}$			1	μA
Response Time	t_R	R_L=5.1kΩ to V_{CC} (Note 5)			1.3		μs
Large Signal Response Time	t_{REL}	V_{IN}=TTL,V_{REF}=+1.4V,R_L=5.1KΩ~ V_{CC}			300		ns

Notes: 1. At output switch point, Vo=1.4V, R_S=0Ω with V_{CC} from 5V ~ 30V and over the full input common-mode range (0V ~ V_{CC} 1.5V).

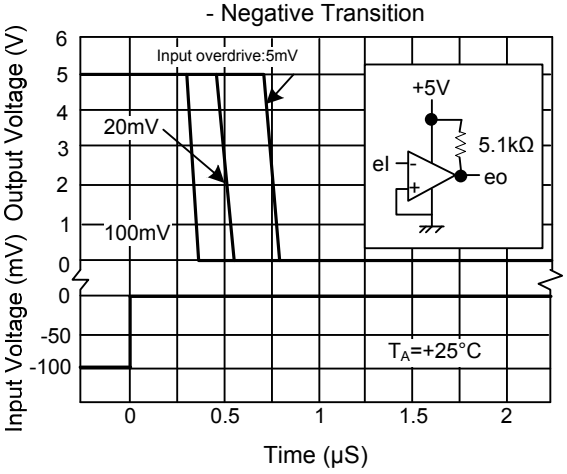
2. The direction of the input current is out of the IC due to the PNP input stage. This current is essentially constant, independent of the state of the output, so no loading charge exists on the reference or input lines.
3. The input common-mode voltage of either input signal voltage should not be allowed to go negative by more than 0.3V.The upper end of the common-mode voltage range is V_{CC} + -1.5V,but either or both inputs can go to +30V without damage.
4. Positive excursions of input voltage may exceed the power supply level. As long as the other voltage remains within the common-mode range the comparator will provide a proper output state.
   The low input voltage state must not be less than -0.3V (or 0.3V below the negative power supply, if used).
5. The response time specified is for a 100mV input step with 5mV overdrive. For larger overdrive signals 300ns can be obtained.

■ TYPICAL CHARACTERISTICS

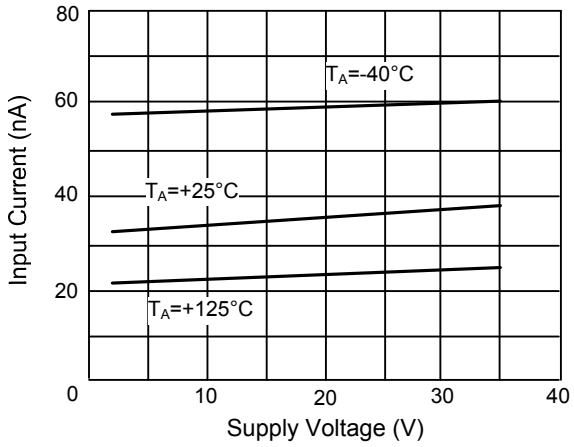
Supply Current vs. Supply Voltage



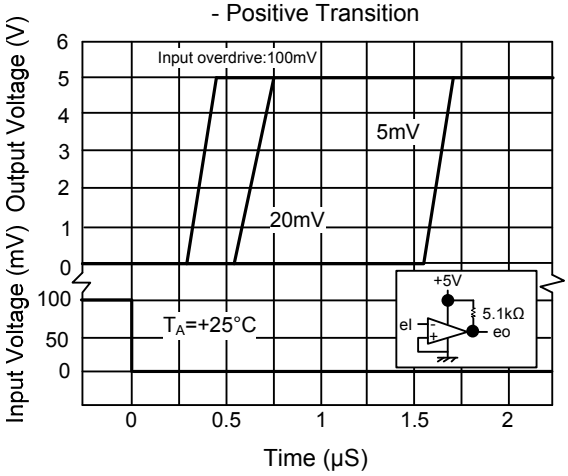
Response Time for vs. Input Overdrives - Negative Transition



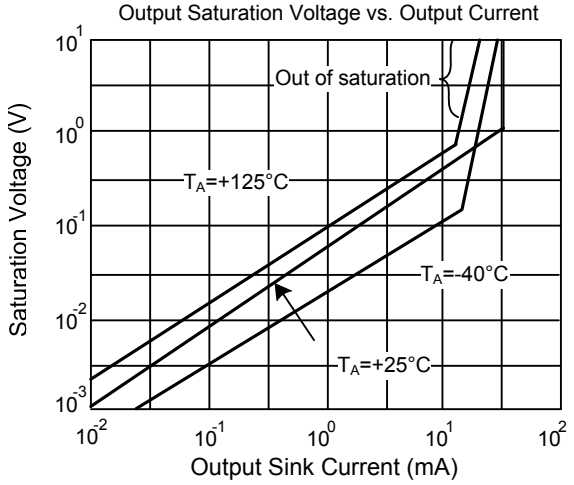
Input Current vs. Supply Voltage



Response Time for vs. Input Overdrives - Positive Transition



Output Saturation Voltage vs. Output Current



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