

# KA331

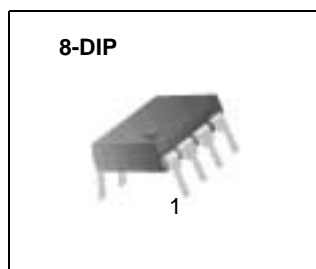
## V-F Converter

### Features

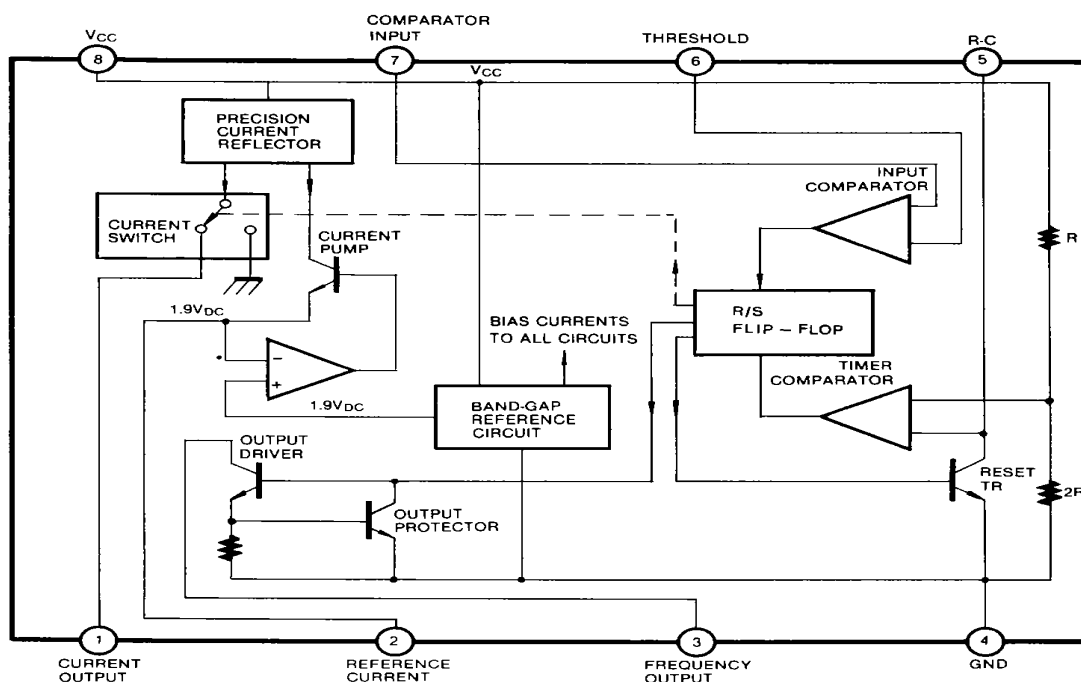
- Guaranteed linearity: 0.01% max.
- Low power dissipation: 15mW at 5V
- Wide range of full scale frequency: 1Hz to 100KHz
- Pulse output compatible with all logic forms
- Wide dynamic range: 100dB min at 10KHz full scale frequency

### Description

This voltage to frequency converter provides the output pulse train at a frequency precisely proportional to the applied input voltage. The KA331 can operate at power supplies as low as 4.0V and be changed output frequency from 1Hz to 100KHz. It is ideally suited for use in simple low-cost circuit for analog-to digital conversion, long term integration, linear frequency modulation or demodulation, frequency-to-voltage conversion, and many other functions.



### Internal Block Diagram



## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	40	V
Input Voltage	$V_I$	$-0.2 \sim +V_{CC}$	V
Operating Temperature Range	$T_{OPR}$	$0 \sim +70$	$^\circ\text{C}$
Power Dissipation	$P_D$	500	mW

## Electrical Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
VFC Non-Linearity	VFCNL	$4.5 \leq V_{CC} \leq 20\text{V}$	-	$\pm 0.003$	$\pm 0.01$	% Full-Scale
Conversion Accuracy Scale Factor	ACCUR	$V_I = -10\text{V}$ , $R_S = 14\text{K}\Omega$	0.90	1.00	1.10	KHz/V
Chang Of Gain With $V_{CC}$	$V_{CC}\Delta G/V_{CC}$	$4.5\text{V} \leq V_{CC} \leq 10\text{V}$	-	0.01	0.1	%/V
		$10\text{V} \leq V_{CC} \leq 40\text{V}$	-	0.006	0.06	
Rated Full - Scale Frequency	f	$V_I = -10\text{V}$	10.0	-	-	KHz
<b>INPUT COMPARATOR</b>						
Offset Voltage	$V_{IO}$	$0^\circ\text{C} \leq T_A \leq +70^\circ\text{C}$	-	$\pm 3$	$\pm 10$	mV
Bias Current	$I_{BIAS}$	-	-	-80	-300	nA
Offset Current	$I_{IO}$	-	-	$\pm 8$	$\pm 100$	nA
Common-Mode Range	$V_{CM}$	$0^\circ\text{C} \leq T_A \leq +70^\circ\text{C}$	-0.2	-	$V_{CC}-2.0$	V
<b>TIMER (PIN 5)</b>						
Timer Threshold Voltage	$V_{TH}$	-	0.63	0.667	0.701	$\times V_{CC}$
Input Bias Current	$I_{BIAS}$	$V_{CC} = 15\text{V}$ , $0\text{V} \leq V_5 \leq 9.9\text{V}$	-	$\pm 10$	$\pm 100$	nA
		$V_5 = 10\text{V}$	-	200	1000	nA
Saturation Voltage	$V_{SAT}$	$I = 5\text{mA}$	-	0.22	0.5	V
<b>CURRENT SOURCE (PIN 1)</b>						
Output Current	$I_O$	$R_S = 14\text{K}\Omega$ , $V_1 = 0\text{V}$	116	136	156	$\mu\text{A}$
Change with Voltage	$\Delta I_O/\Delta V_1$	$0\text{V} \leq V_1 \leq 10\text{V}$	-	0.2	1.0	$\mu\text{A}$
Current Source Off Leakage	$I_{LKG}$	-	-	0.02	10.0	nA
<b>REFERENCE VOLTAGE (PIN 2)</b>						
Reference Voltage	$V_{REF}$	-	1.70	1.89	2.08	$V_{DC}$
Stability vs Temperature	$ST_T$	-	-	$\pm 60$	-	ppm/ $^\circ\text{C}$
Stability vs Time, 1000Hours	$ST_T$	-	-	$\pm 0.1$	-	%
<b>LOGIC OUTPUT (Pin 3)</b>						
Saturation Voltage	$V_{SAT}$	$I = 5\text{mA}$	-	0.15	0.50	V
		$I = 3.2\text{mA}$	-	0.10	0.40	
Off Leakage	$I_{LKG}$	-	-	$\pm 0.05$	1.0	$\mu\text{A}$
<b>SUPPLY CURRENT</b>						
Supply Current	$I_{CC}$	$V_{CC} = 5\text{V}$	1.5	3.0	6.0	mA
		$V_{CC} = 40\text{V}$	2.0	4.0	8.0	

## Typical Applications

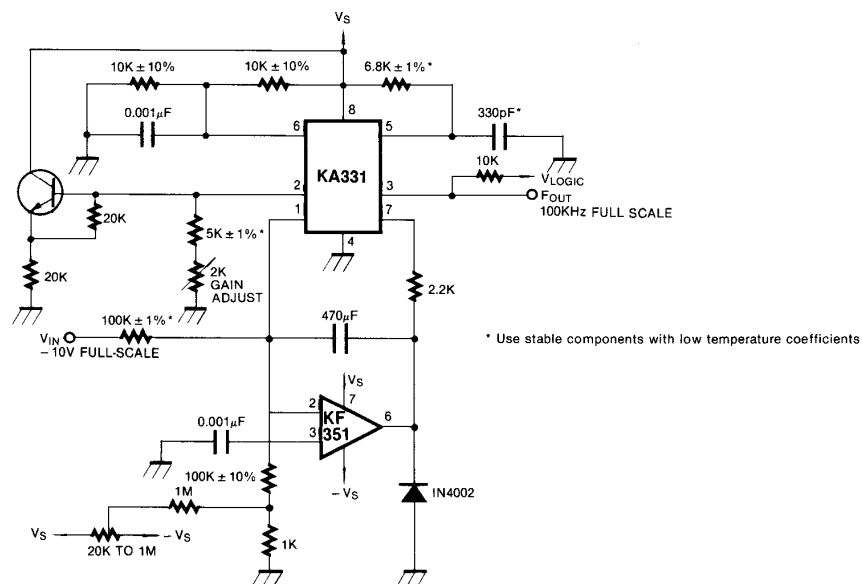


Figure 1. Precision Voltage-to-Frequency Converter, 100KHz Full-Scale

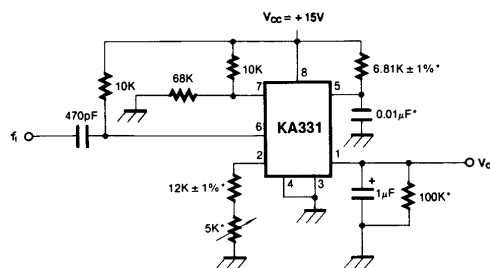


Figure 2. Simple Frequency-to-Voltage Converter, 10KHz Full-Scale

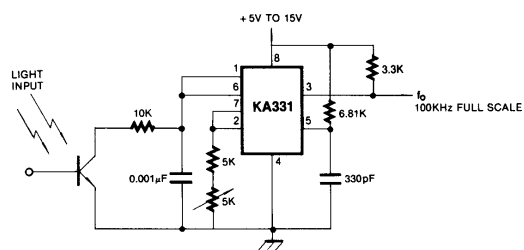


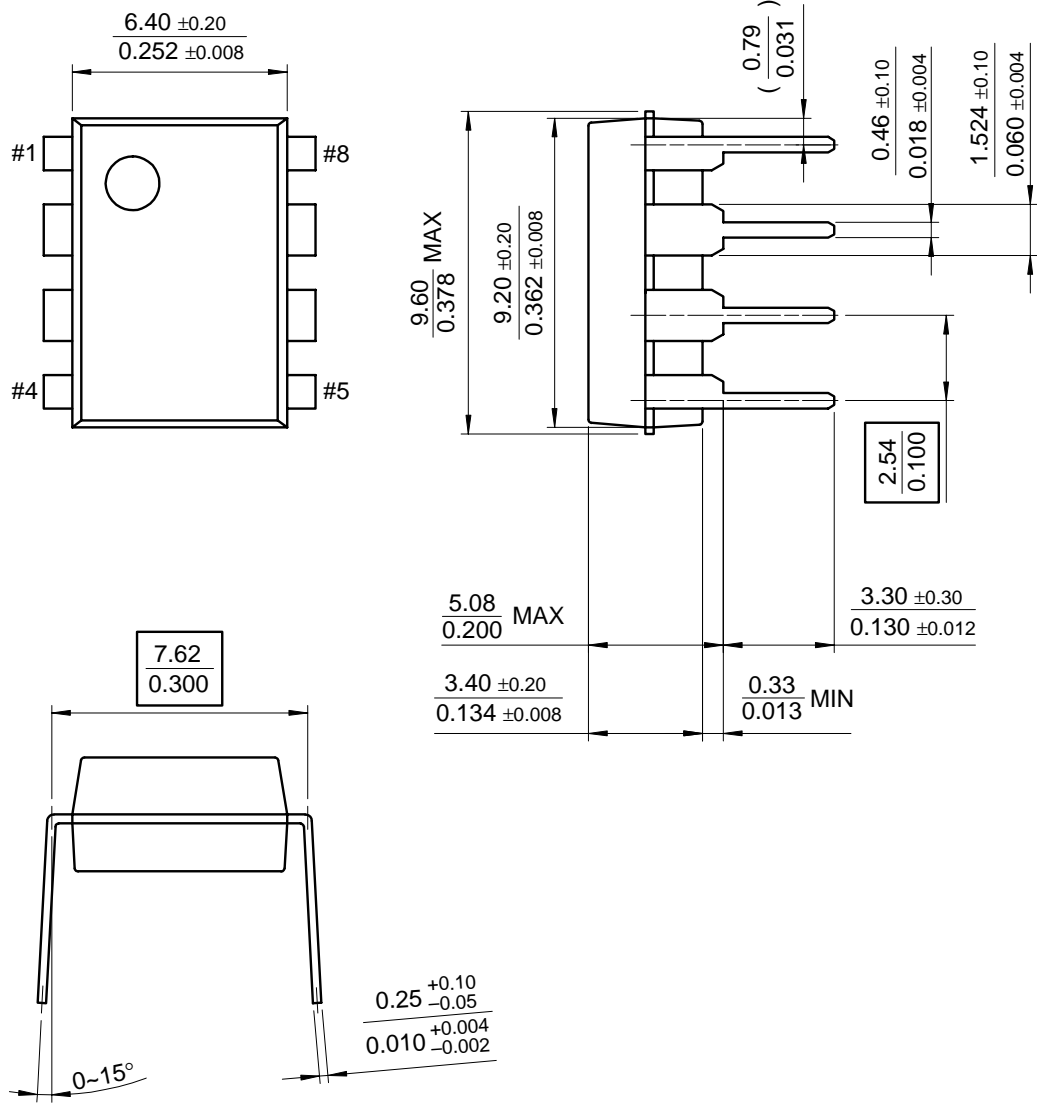
Figure 3. Light Intensity to Frequency Converter

Mechanical Dimensions

Package

Dimensions in millimeters

8-DIP



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## Ordering Information

Product Number	Package	Operating Temperature
KA331	8-DIP	0 ~ + 70°C

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