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KA331

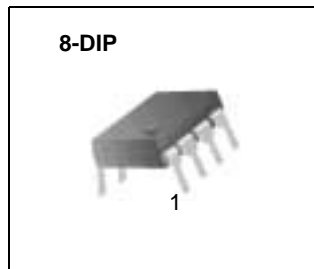
V-F Converter

Features

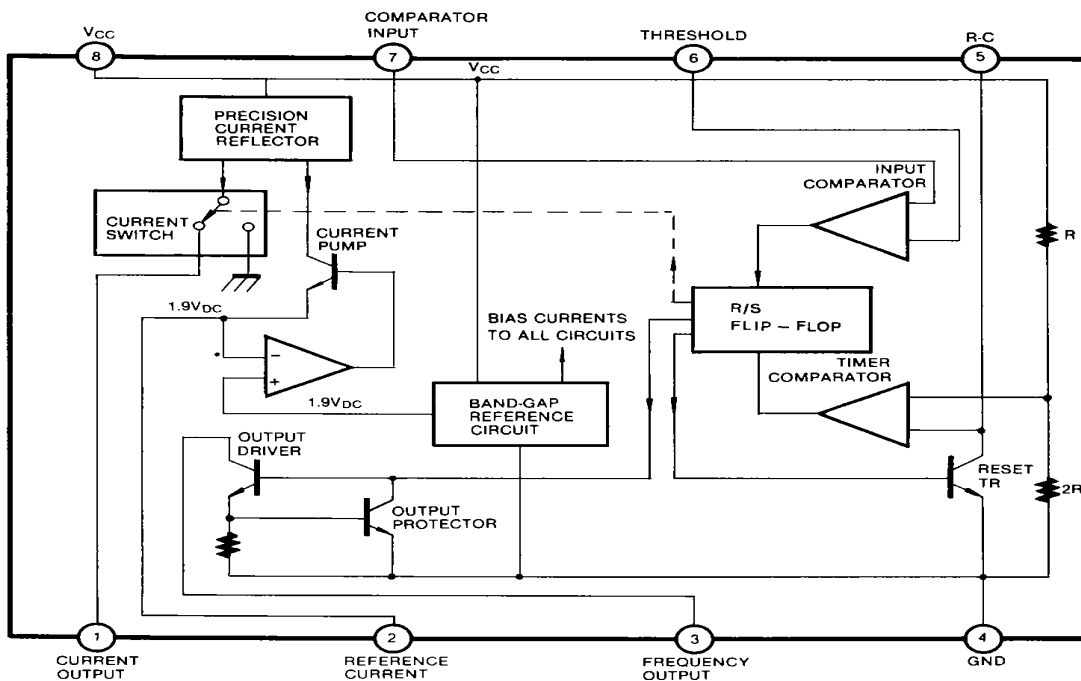
- Guaranteed linearity: 0.01% max.
- Low power dissipation: 15mW at 5V
- Wide range of full scale frequency: 1Hz to 100KHz
- Pulse output compatible with all logic forms
- Wide dynamic range: 100dB min at 10KHz full scale frequency

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°C)

| Parameter | Symbol | Value | Unit |
|-----------------------------|------------------|--------------------------|------|
| Supply Voltage | V _{CC} | 40 | V |
| Input Voltage | V _I | -0.2 ~ + V _{CC} | V |
| Operating Temperature Range | T _{OPR} | 0 ~ +70 | °C |
| Power Dissipation | P _D | 500 | mW |

Electrical Characteristics

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|------------------------------------|------------------------------------------------------|------|--------|----------------------|------------------|
| VFC Non-Linearity | VFCNL | 4.5 ≤ V _{CC} ≤ 20V | - | ±0.003 | ±0.01 | % Full-Scale |
| Conversion Accuracy Scale Factor | ACCUR | V _I = -10V, R _S = 14KΩ | 0.90 | 1.00 | 1.10 | KHz/V |
| Chang Of Gain With VCC | V _{CC} ΔG/V _{CC} | 4.5V ≤ V _{CC} ≤ 10V | - | 0.01 | 0.1 | % / V |
| | | 10V ≤ V _{CC} ≤ 40V | - | 0.006 | 0.06 | |
| Rated Full - Scale Frequency | f | V _I = -10V | 10.0 | - | - | KHz |
| INPUT COMPARATOR | | | | | | |
| Offset Voltage | V _{IO} | 0°C ≤ T _A ≤ +70°C | - | ±3 | ±10 | mV |
| Bias Current | I _{BIAS} | - | - | -80 | -300 | nA |
| Offset Current | I _{IO} | - | - | ±8 | ±100 | nA |
| Common-Mode Range | V _{CM} | 0°C ≤ T _A ≤ +70°C | -0.2 | - | V _{CC} -2.0 | V |
| TIMER (PIN 5) | | | | | | |
| Timer Threshold Voltage | V _{TH} | - | 0.63 | 0.667 | 0.701 | ×V _{CC} |
| Input Bias Current | I _{BIAS} | V _{CC} = 15V, 0V ≤ V ₅ ≤ 9.9V | - | ±10 | ±100 | nA |
| | | V ₅ = 10V | - | 200 | 1000 | nA |
| Saturation Voltage | V _{SAT} | I = 5mA | - | 0.22 | 0.5 | V |
| CURRENT SOURCE (PIN 1) | | | | | | |
| Output Current | I _O | R _S = 14KΩ, V ₁ = 0V | 116 | 136 | 156 | μA |
| Change with Voltage | ΔI _O /ΔV ₁ | 0V ≤ V ₁ ≤ 10V | - | 0.2 | 1.0 | μA |
| Current Source Off Leakage | I _{LKG} | - | - | 0.02 | 10.0 | nA |
| REFERENCE VOLTAGE (PIN 2) | | | | | | |
| Reference Voltage | V _{REF} | - | 1.70 | 1.89 | 2.08 | V _{DC} |
| Stability vs Temperature | ST _T | - | - | ±60 | - | ppm/°C |
| Stability vs Time, 1000Hours | ST _T | - | - | ±0.1 | - | % |
| LOGIC OUTPUT (Pin 3) | | | | | | |
| Saturation Voltage | V _{SAT} | I = 5mA | - | 0.15 | 0.50 | V |
| | | I = 3.2mA | - | 0.10 | 0.40 | |
| Off Leakage | I _{LKG} | - | - | ±0.05 | 1.0 | μA |
| SUPPLY CURRENT | | | | | | |
| Supply Current | I _{CC} | V _{CC} = 5V | 1.5 | 3.0 | 6.0 | mA |
| | | V _{CC} = 40V | 2.0 | 4.0 | 8.0 | |

Typical Applications

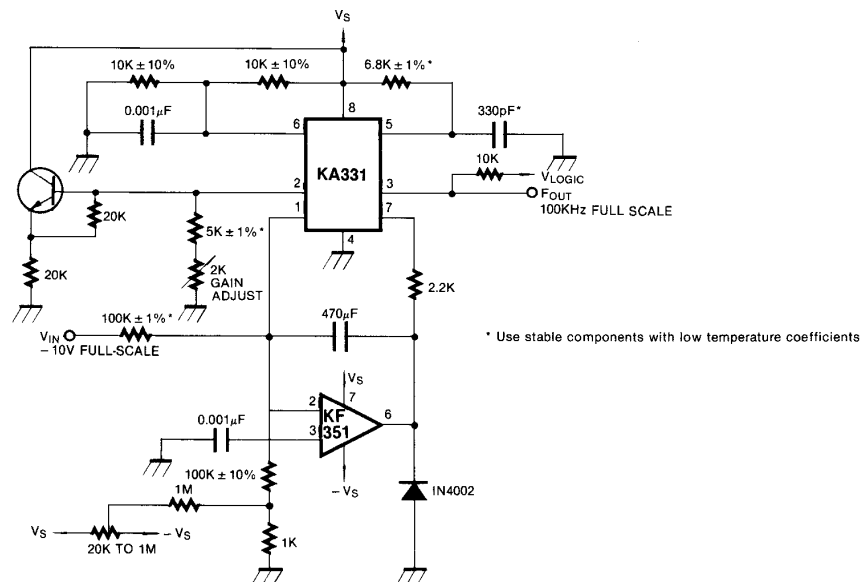


Figure 1. Precision Voltage-to-Frequency Converter, 100KHz Full-Scale

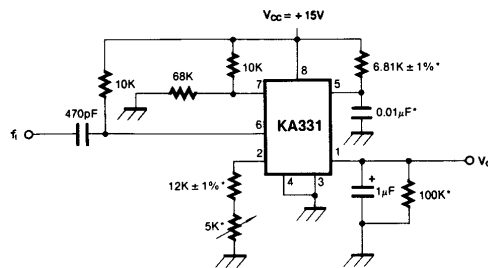


Figure 2. Simple Frequency-to-Voltage Converter, 10KHz Full-Scale

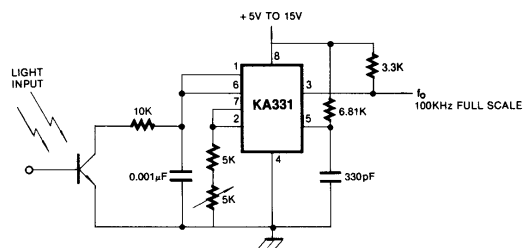


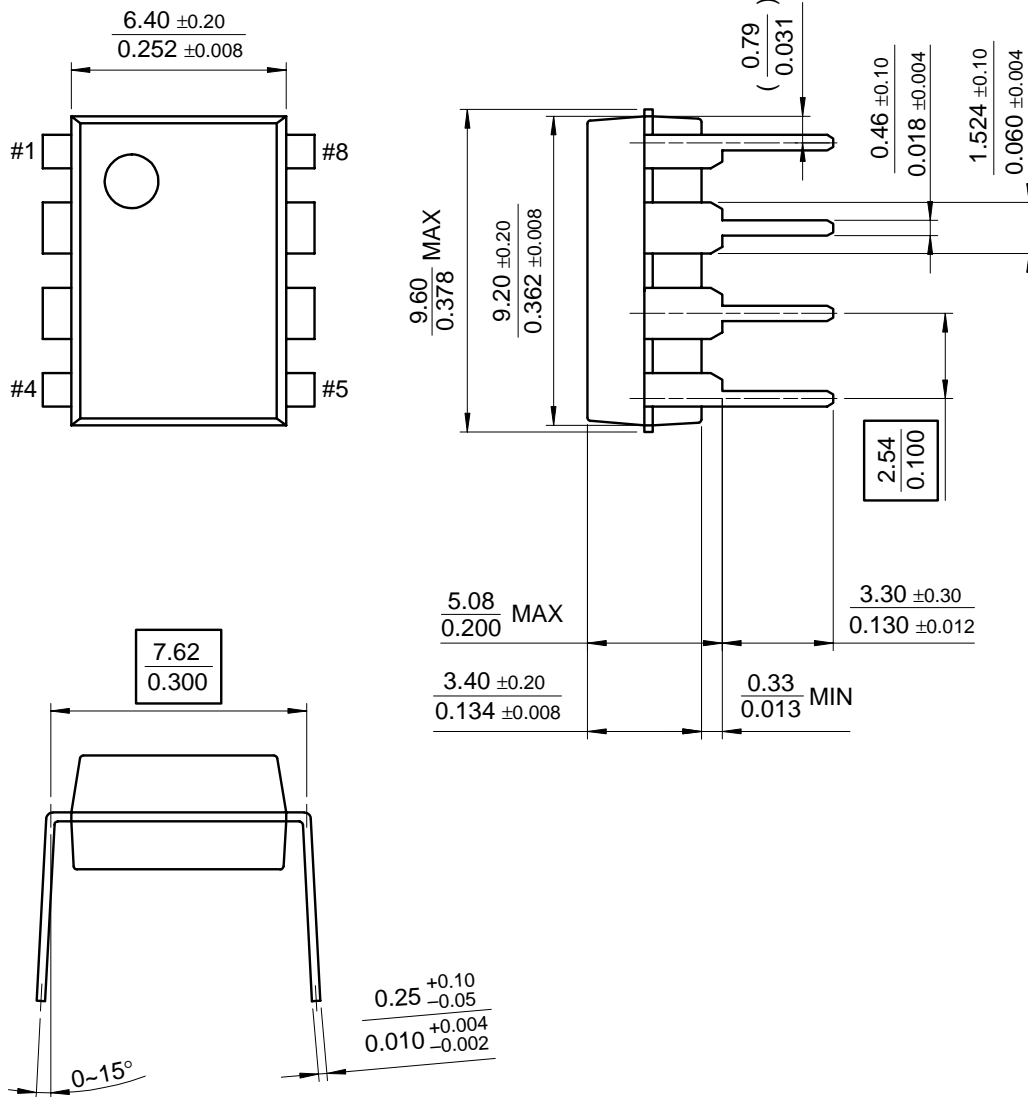
Figure 3. Light Intensity to Frequency Converter

Mechanical Dimensions

Package

Dimensions in millimeters

8-DIP



Ordering Information

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

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