LM331

V-F Converter

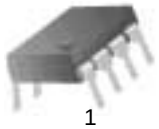
Features

- 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 LM331 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.

8-DIP



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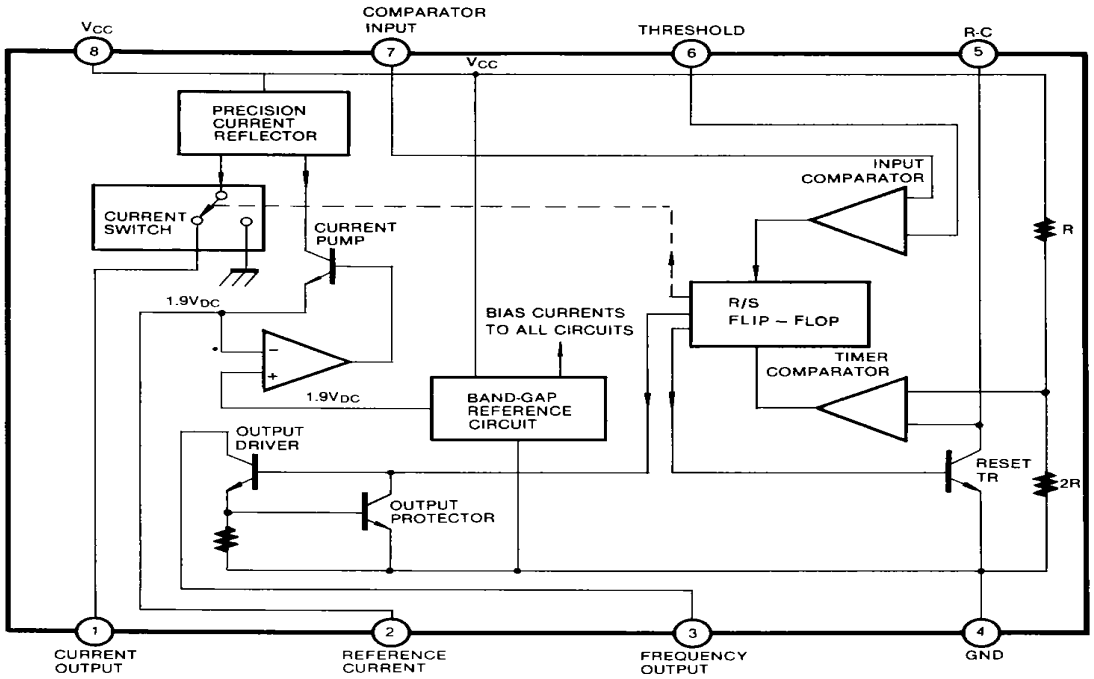
Internal Block Diagram



Rev. 1.0.0

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 V_{CC}	$V_{CC}\Delta G/V_{CC}$	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	$\Delta I_O/\Delta V_1$	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

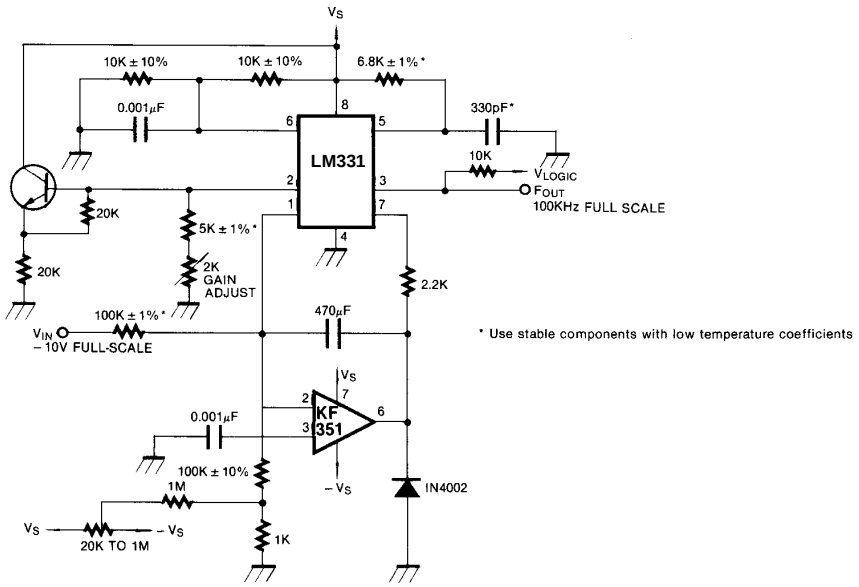


Figure 1. Precision Voltage-to-Frequency Converter, 100KHz Full-Scale

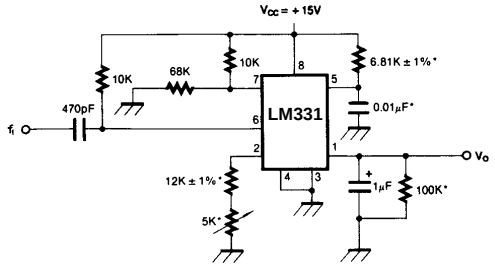


Figure 2. Simple Frequency-to-Voltage Converter, 10KHz Full-Scale

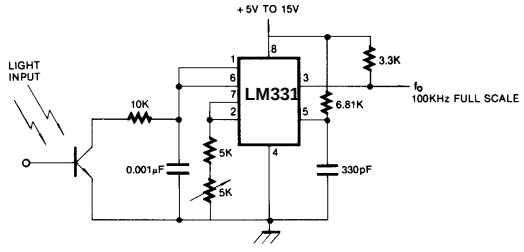


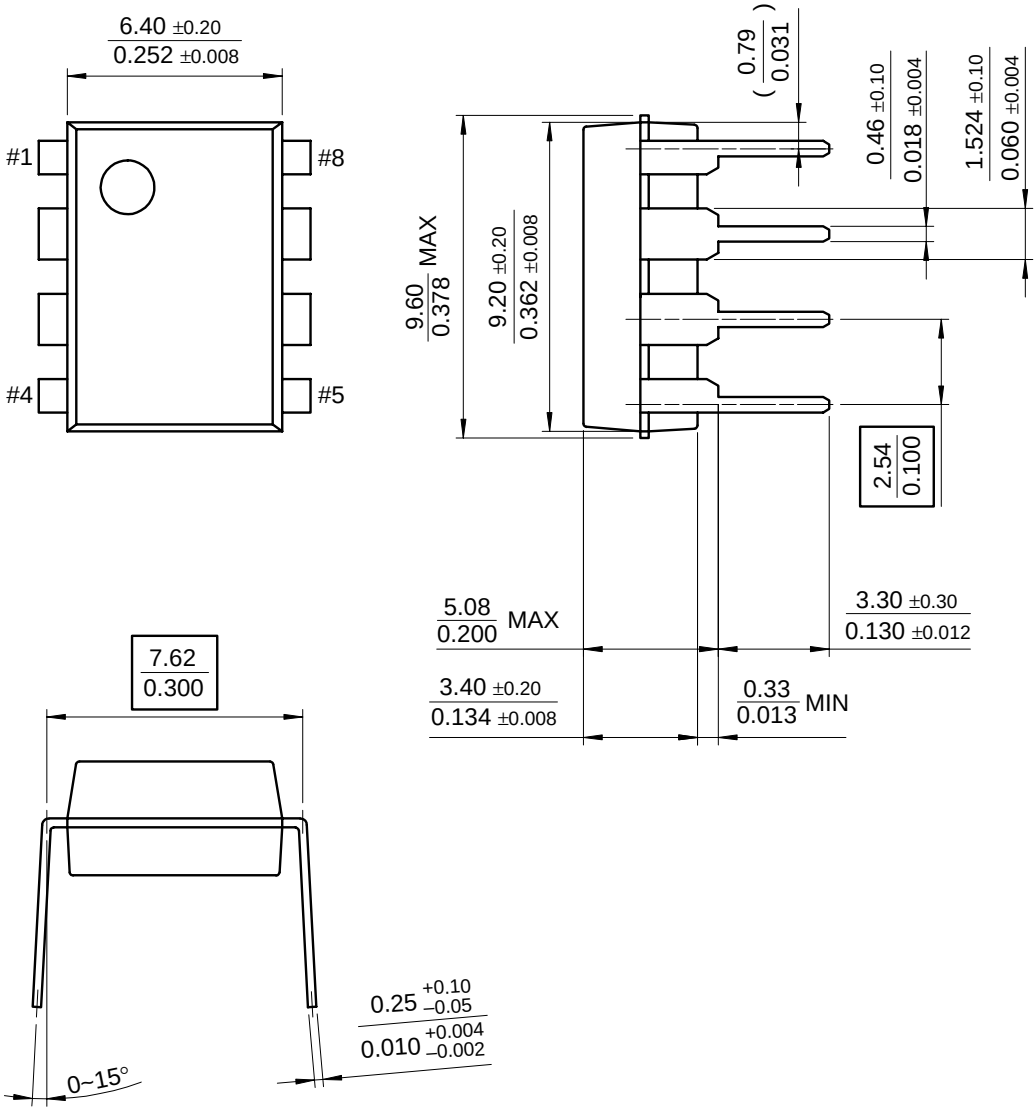
Figure 3. Light Intensity to Frequency Converter

Mechanical Dimensions

Package

Dimensions in millimeters

8-DIP



Ordering Information

Product Number	Package	Operating Temperature
LM331N	8-DIP	0 ~ + 70°C