

Precision voltage/frequency converter

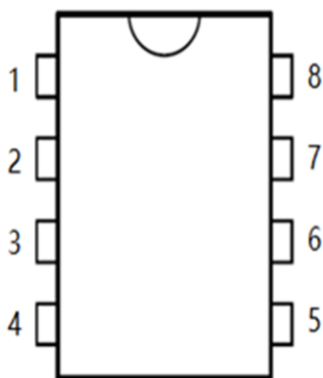
Description :

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

Features :

- With a maximum linearity of 0.01%
- Improved application performance of voltage/frequency converters
- Dual or single power supply
- Working voltage: 5V
- The digital pulse output terminal level is compatible with all 5V standard logic circuits
- Excellent temperature stability, temperature drift less than ± 50 ppm/
- Low power consumption: 15mW typical value (5V working voltage)
- Wide dynamic range, with a minimum of 100dB in the frequency range of 100kHz
- Full range frequency range: 1Hz~100kHz

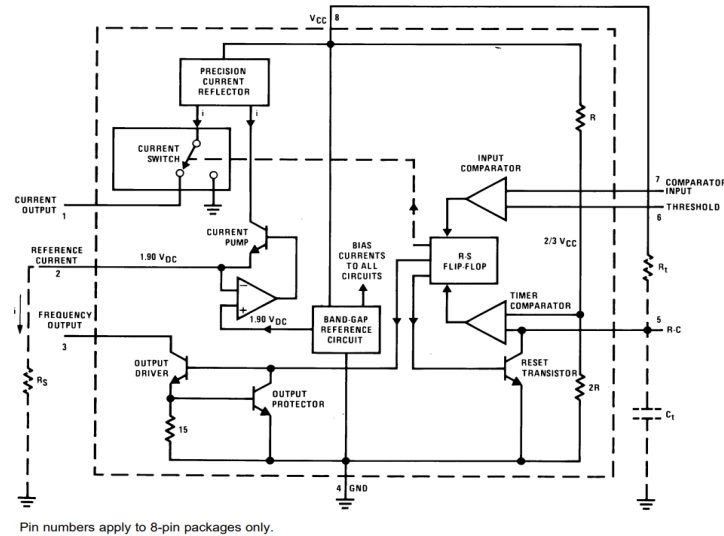
Pin Assignment :



(DIP8/SOP8)

Pin No.	Pin Definition	I/O	Function Description
1	CURO	O	current output
2	REFCUR	O	reference current
3	F _{OUT}	O	Frequency output
4	GND	-	grounding
5	R/C	I	Timing comparison input
6	THD	I	Comparator inverter input terminal
7	COM I	I	Comparator in phase input terminal
8	V _s	-	power supply

Block Diagram :



LM331

Absolute Maximum Ratings

Parameter	limit value	unit
supply voltage	40	V
Output short-circuit current to GND	Continuous	
Output short-circuit current to VCC	Continuous	
INPUT VOLTAGE	-0.2 ~ Vs	V
Operating temperature range	0 ~ +70	°C
Power consumption (25 °C)	1.25	W
Welding temperature (spot welding, 10 seconds)	260	°C

Note : Limit parameters refer to the limit values that cannot be exceeded under any conditions. If this limit value is exceeded, it may cause physical damage such as product deterioration; At the same time, it cannot be guaranteed that the chip can operate normally when approaching the limit parameters.

Electrical characteristics (TA=25 °C, Unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
VFC Non-Linearity	VFCNL	$4.5 \leq V_{CC} \leq 20V$	-	± 0.003	± 0.01	% Full-Scale
Conversion Accuracy Scale Factor	ACCUR	$V_I = -10V, R_S = 14K\Omega$	0.90	1.00	1.10	KHz/V
Chang Of Gain With VCC	VCCΔG/VCC	$4.5V \leq V_{CC} \leq 10V$	-	0.01	0.1	%V
		$10V \leq V_{CC} \leq 40V$	-	0.006	0.06	
Rated Full - Scale Frequency	f	$V_I = -10V$	10.0	-	-	KHz
INPUT COMPARATOR						
Offset Voltage	V _{IO}	$0^\circ C \leq T_A \leq +70^\circ C$	-	± 3	± 10	mV
Bias Current	I _{BIAS}	-	-	-80	-300	nA
Offset Current	I _{IO}	-	-	± 8	± 100	nA
Common-Mode Range	V _{CM}	$0^\circ C \leq T_A \leq +70^\circ C$	-0.2	-	V _{CC} -2.0	V
TIMER (PIN 5)						
Timer Threshold Voltage	V _{TH}	-	0.63	0.667	0.701	$\times V_{CC}$
Input Bias Current	I _{BIAS}	$V_{CC} = 15V, 0V \leq V_5 \leq 9.9V$	-	± 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	$R_S = 14K\Omega, V_1 = 0V$	116	136	156	μA
Change with Voltage	$\Delta I_O / \Delta V_1$	$0V \leq V_1 \leq 10V$	-	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	STT	-	-	± 60	-	ppm/ $^\circ C$
Stability vs Time, 1000Hours	STT	-	-	± 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

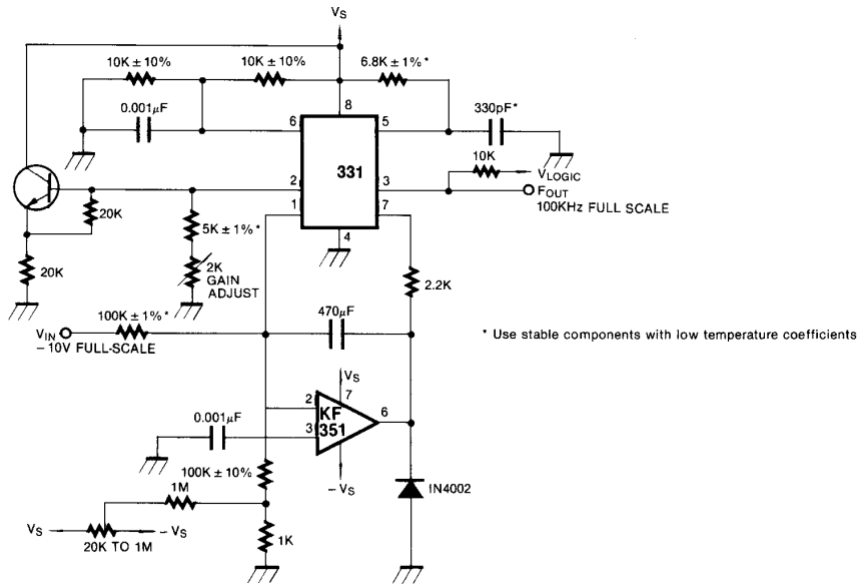


Figure 1. Precision Voltage-to-Frequency Converter, 100KHz Full-Scale

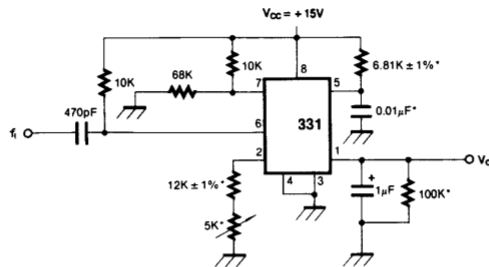


Figure 2. Simple Frequency-to-Voltage Converter, 10KHz Full-Scale

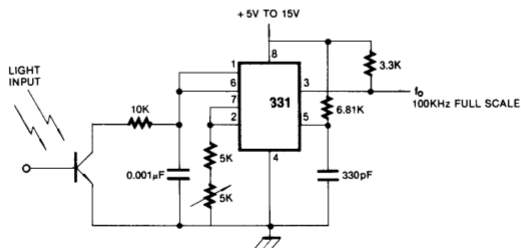
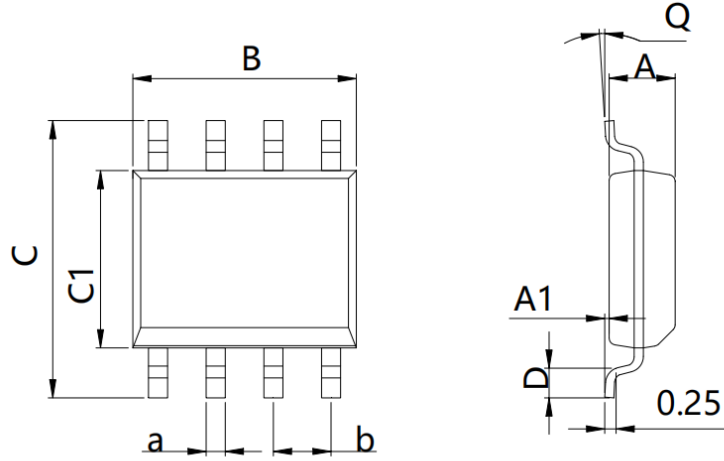


Figure 3. Light Intensity to Frequency Converter

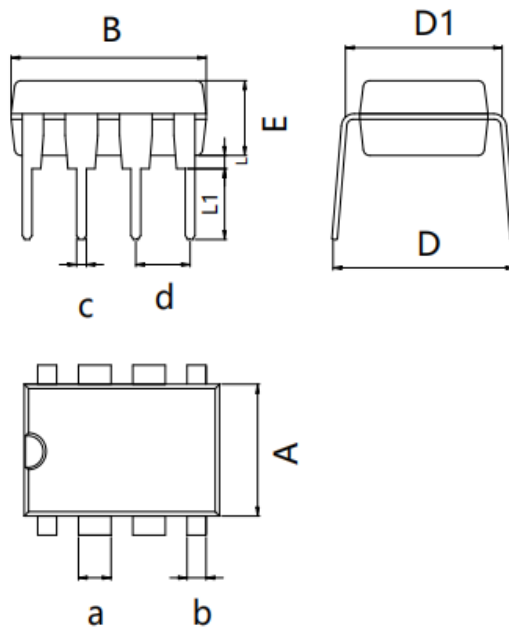
PACKAGE MECHANICAL DATA

SOP8



Dimensions In Millimeters(SOP8)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

DIP8



Dimensions In Millimeters(DIP8)											
Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	9.00	8.40	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	9.50	9.00	7.82	3.55	0.70	3.60	1.55	0.90	0.50	