Voltage to frequency converter

Feature

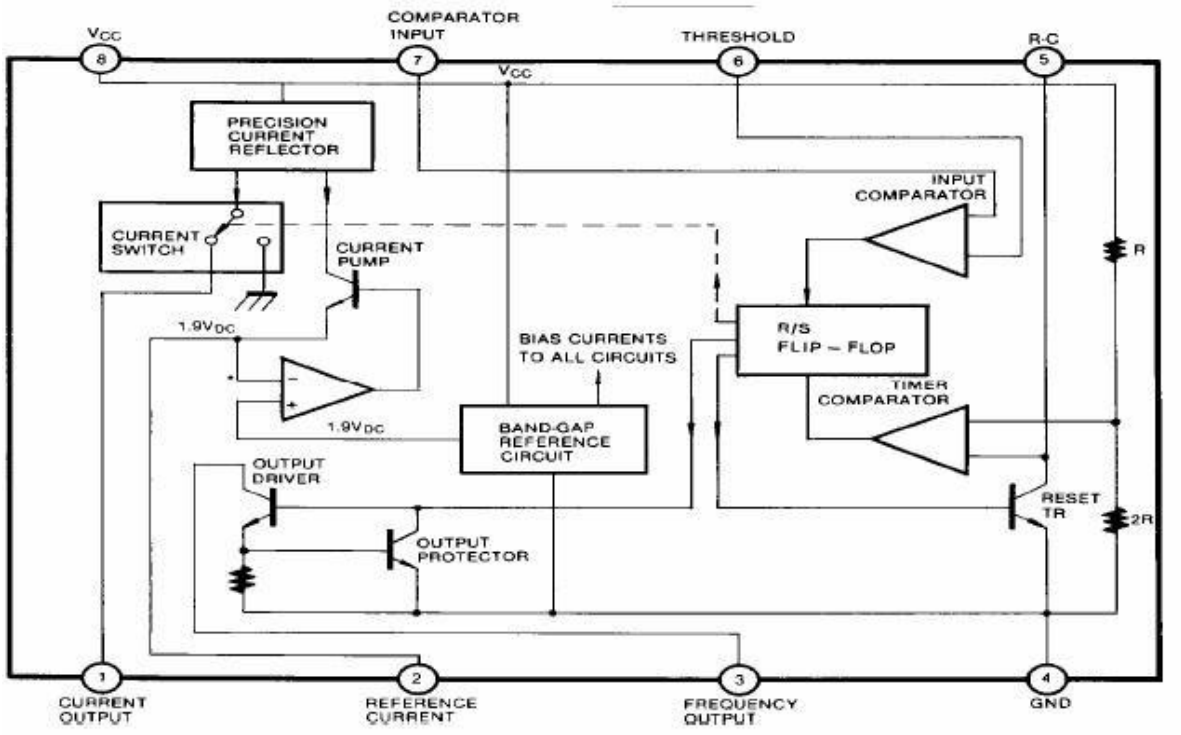
- Guaranteed linearity: 0.01% (maximum)
- Low power consumption: 15mW (at 5V)
- Wide comprehensive frequency range: 1Hz - 100KHz
- Pulse output compatible with all logic forms
- Wide dynamic range: 100dB

Description

The voltage-to-frequency converter provides an output pulse sequence that is accurately proportional to the applied input voltage. The LM331 can convert output frequencies from 1Hz to 100KHz when powered as low as 4V.

It is well-suited for use in simple, low-cost circuits for applications such as analog-to-digital conversion, long-term integration, linear frequency modulation or demodulation, frequency-to-voltage conversion, and many other functions.

Internal structure



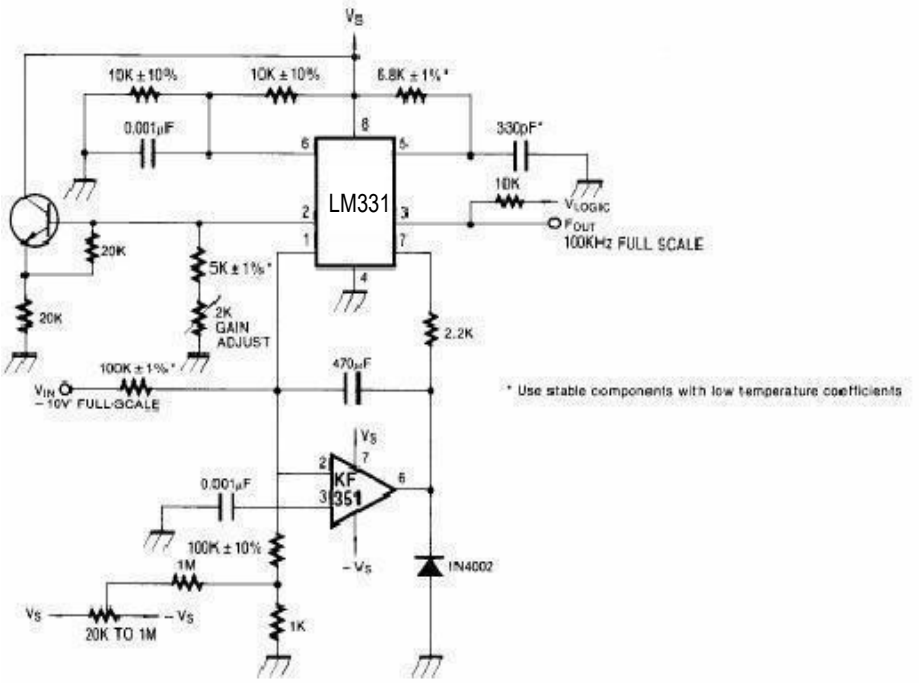
Maximum ratings (T_a = 25°C)

Parameter	Symbol	Range	Uint
operating voltage	V_{cc}	40	V
input voltage	V_I	-0.2 ~ + V_{CC}	V
operating temperature range	T_{OPR}	0~ +70	℃
power consumption	P_D	500	mW

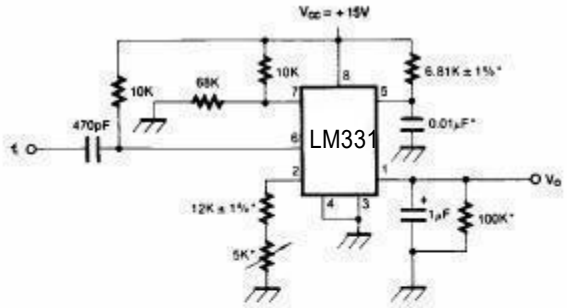
Electrical characteristics

Parameter	Symbol	Condictions	Min	Typ	Max	Uint
V_{fc} nonlinearity	V_{FCNL}	4.5 < V_{CC} 20V	-	±0.003	±0.01	% Full-Scale
conversion accuracy scale factor	A_{CCUR}	V_I= -10V, Rs= 14KΩ	0.9	1	1.1	KHz/V
gain virtual channel connection	$V_{CC}\Delta G/V_{CC}$	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	-	-	KHz
Input Comparator						
offset voltage	V_{IO}	0°C<TA<+70°C	-	±3	±10	mV
bias current	I_{BIAS}	-	-	-80	-300	nA
offset voltage	I_{IO}	-	-	±8	±100	nA
common-mode range	V_{CM}	0cC <TA< +70°C	-0.2	-	V_{CC}- 2.0	V
Timer (pin 5)						
timer threshold voltage	V_{TH}		0.63	0.667	0.701	
input bias current	I_{BIAS}	V_{CC} = 15V, 0V<V5<9.9V		±10	±100	nA
		V5= 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 = 14KQ, V_1= 0V	116	136	156	uA
voltage change	$\Delta I_O/\Delta V_1$	0V<V_1 <10V	-	0.2	1	uA
leakage current source off	I_{LKG}	-	-	0.02	10	nA
Reference Voltage (Pin 2)						
reference voltage	V_{REF}	-	1.7	1.89	2.08	VDC
temperature coefficient (of stability)	S_{TT}	-	-	±60	--	ppm/℃
stability over time, 1000 hours	S_{TT}	-	-	±0.1	--	%
Logic Output (Pin 3)						
saturation voltage	V_{SAT}	I = 5mA	-	0.15	0.5	
		I = 3.2mA	-	0.1	0.4	V
leakage shutdown	I_{LKG}	-	-	±0.05	1	uA
Supply Current						
supply current	I_{CC}	V_{cc} = 5V	1.5	3	6	mA
		V_{CC} = 40V	2	4		

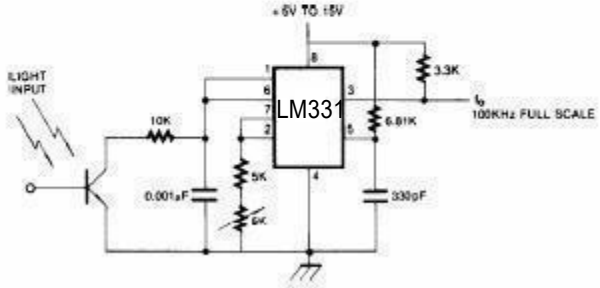
Typical application



1 High-precision voltage-to-frequency converter, full-scale at 100 kHz



2 Basic frequency-to-voltage converter, full-scale at 100 kHz



3 Light intensity converter

Package outline dimensions

(in millimeters)

8-DIP