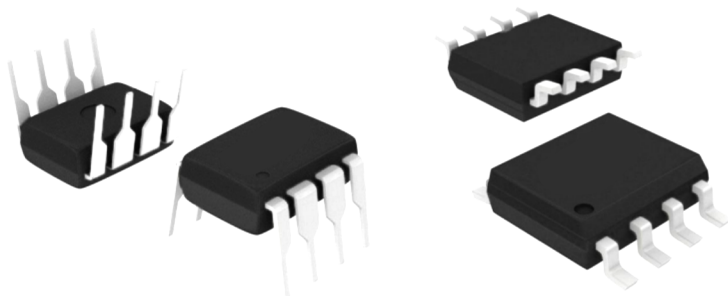


Descriptions

The voltage-frequency converter delivers an output pulse train to the applied input voltage at a precisely proportional frequency. The LM331 can convert the output frequency from 1Hz to 100KHz at a power supply as low as 4V. It is well suited for use in simple low-cost circuits for analog-to-digital conversion, long-term integration, LFM or demodulation, frequency-voltage conversion, and many other functions.



DIP-8

SOP-8

Feature

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

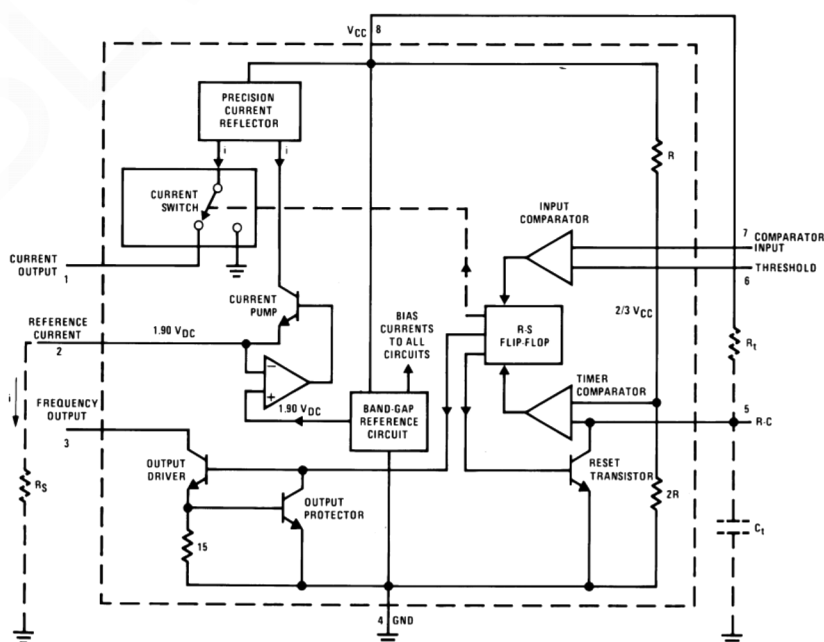
Applications

- Voltage to Frequency Conversions
- Frequency to Voltage Conversions
- Remote-Sensor Monitoring
- Tachometers

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW LM331N	DIP-8	LM331N	Tube	2000pcs/Box
XBLW LM331DTR	SOP-8	LM331	Tape	2500pcs/Reel

SCHEMATIC DIAGRAM



EXTREME RATINGS

TA=25°C, unless otherwise noted

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

ELECTRICAL CHARACTERISTICSTA=25°C, V_{CC}=5V, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
VFC Non-Linearity	VFCNL	4.5<V _{CC} 20V		±0.00 3	±0.01	%Full-Scale
Conversion Accuracy Scale Factor (Gain)	ACCUR	M=-10V, R _s =14K Ω	0.90	1.00	1.10	KHz/V
Change of Gain with V _S	V _{CC} Δ 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=-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, Pin 5	V _{TH}		0.63	0.667	0.701	
Input Bias Current, Pin 5	I _{BIAS}	V _{CC} =15V, 0V<V _S <9.9V		±10	±100	nA
		V _S =10V		200	1000	nA
Saturation Voltage	V _{SAT}	I=5mA		0.22	0.5	V
CURRENT SOURCE(PIN1)						
Output Current	I _O	R _s =14K Ω, V _i =0V	116	136	156	μA
Change with Voltage	ΔI _O /ΔV _i	0V<V _i <10V	m	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	VDC
Stability vs. Temperature	S _{TT}			160		ppm/°C
Stability vs. Time, 1000 Hours	S _{TT}			±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		

TOP VIEW

PIN		I/O	DESCRIPTION
NAME	NO.		
IOUT	1	O	Current Output
IREF	2	I	Reference Current
FOUT	3	O	Frequency Output. This output is an open-collector output and requires a pullup resistor.
GND	4	G	Ground
RC	5	I	R-C filter input
THRESH	6	I	Threshold input
COMPIN	7	I	Comparator Input
VS	8	P	Supply Voltage

[illegible]

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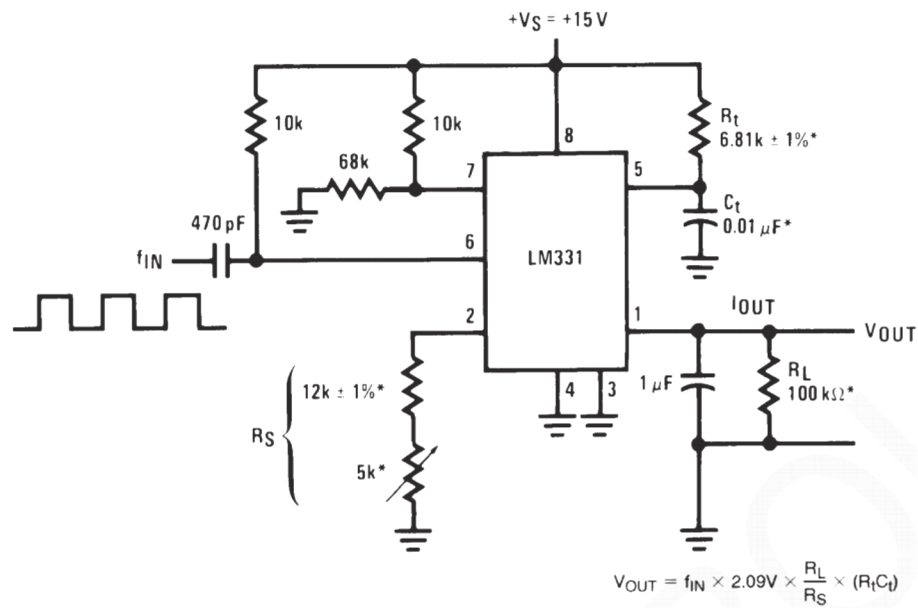


Figure 2 Simple Frequency-to-Voltage Converter,
10 kHz Full-Scale, $\pm 0.06\%$ Non-Linearity

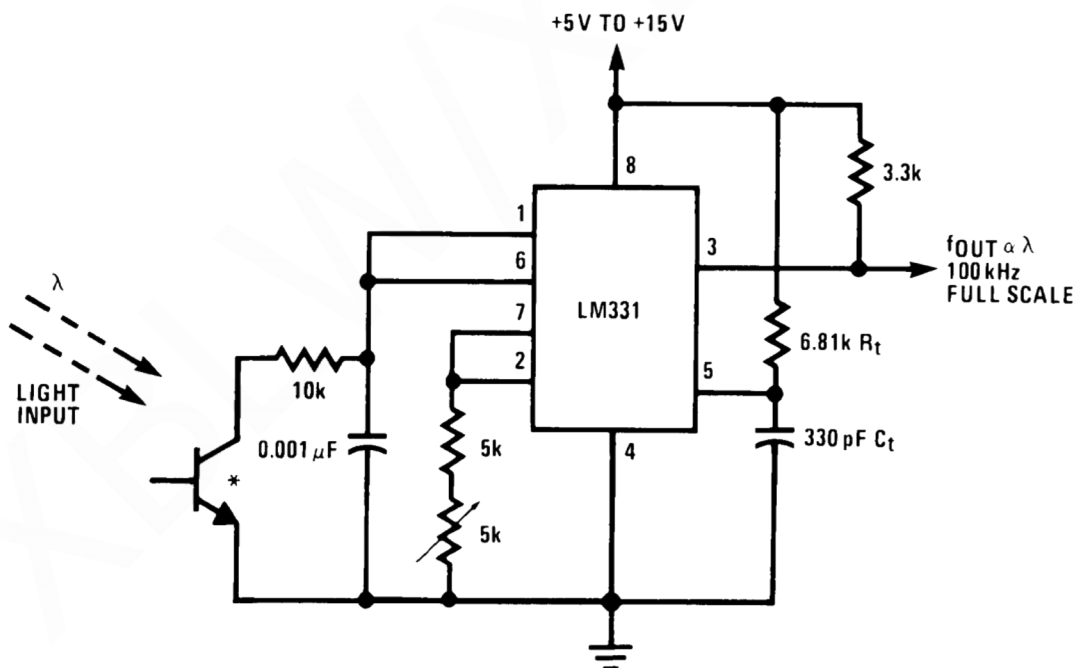
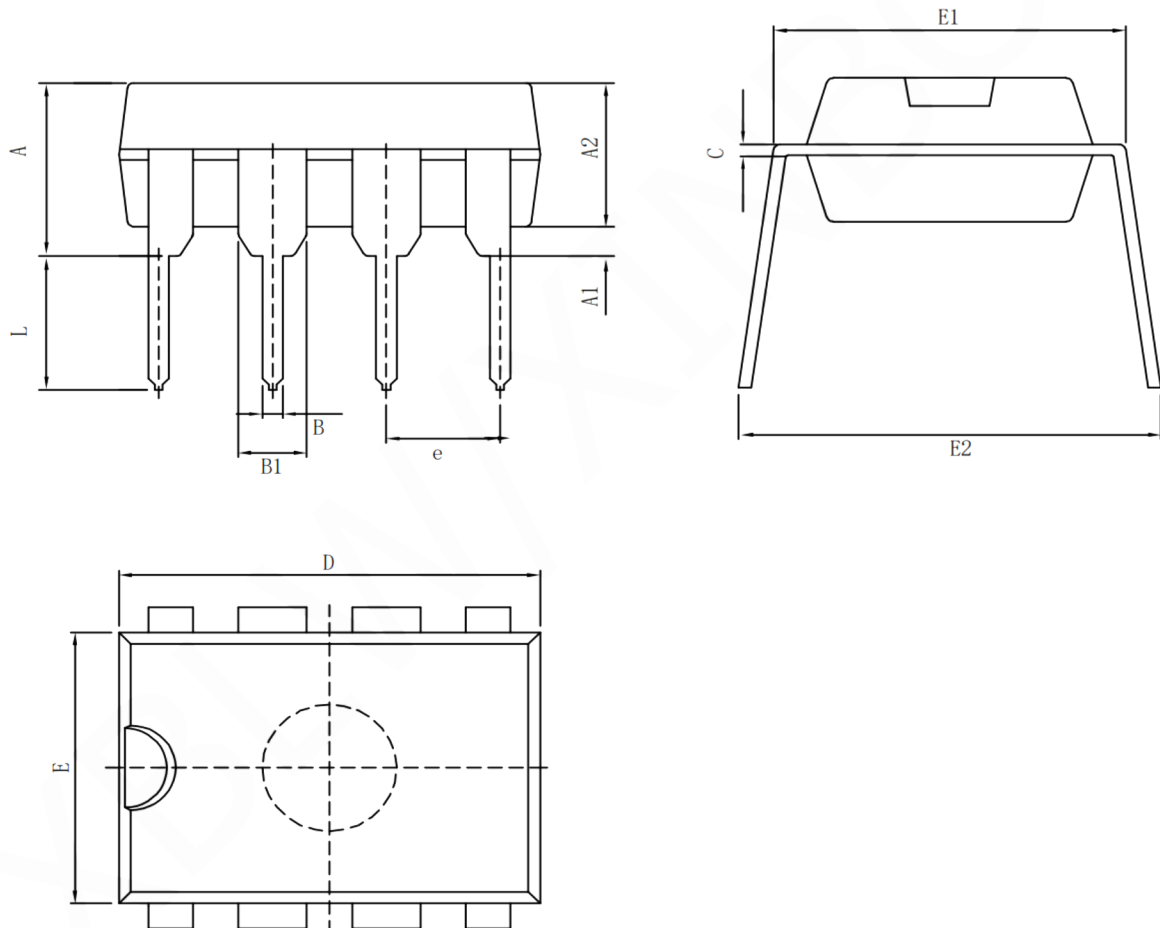


Figure 3 Light Intensity to Frequency Converter

Package Information

• DIP-8

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min (mm)	Max (mm)			Min (in)	Max (in)
A		3.710	4.310	A		0.146	0.170
A1		0.510		A1		0.020	
A2		3.200	3.600	A2		0.126	0.142
B		0.380	0.570	B		0.015	0.022
B1		1.524 (BSC)		B1		0.060 (BSC)	
C		0.204	0.360	C		0.008	0.014
D		9.000	9.400	D		0.354	0.370
E		6.200	6.600	E		0.244	0.260
E1		7.320	7.920	E1		0.288	0.312
e		2.540 (BSC)		e		0.100 (BSC)	
L		3.000	3.600	L		0.118	0.142
E2		8.400	9.000	E2		0.331	0.354



• SOP-8

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min (mm)	Max (mm)			Min (in)	Max (in)
A		1.350	1.750	A		0.053	0.069
A1		0.100	0.250	A1		0.004	0.010
A2		1.350	1.550	A2		0.053	0.061
b		0.330	0.510	b		0.013	0.020
c		0.170	0.250	c		0.006	0.010
D		4.700	5.100	D		0.185	0.200
E		3.800	4.000	E		0.150	0.157
E1		5.800	6.200	E1		0.228	0.224
e		1.270 (BSC)		e		0.050 (BSC)	
L		0.400	1.270	L		0.016	0.050
θ		0°	8°	θ		0°	8°

