钍地半导体
Tudi Semiconductor

Product Specification

TUDI-NJM4151

V-F / F-V CONVERTOR

网址 www.sztdbdt.com

用芯智造·卓越品质

semiconductor device manufacturer

- Design
- research and development
- production
- and sales

Applications

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

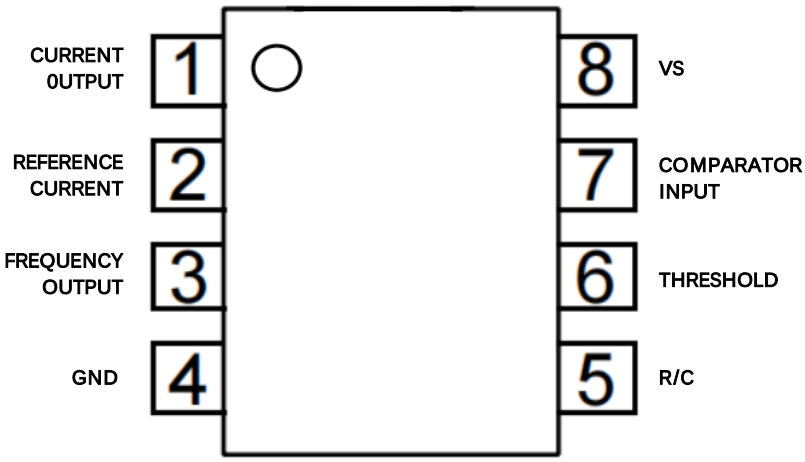


Figure 1. SOP8/DIP8 Pin Diagram

Features

- Ensured Linearity 0.01% Maximum
- Split or Single-Supply Operation
- Operates on Single 5-V Supply
- Low-Cost
- Low Power Consumption: 15 mW Typical at 5 V
- Improved Performance in Existing Voltage-to-Frequency Conversion Applications
- Pulse Output Compatible With All Logic Forms
- Excellent Temperature Stability: ±50 ppm/°C Maximum
- Wide Dynamic Range, 100 dB Minimum at 10-kHz Full Scale Frequency
- Wide Range of Full Scale Frequency: 1 Hz to 100 kHz

Description

The NJM4151 provide a simple low-cost method of A/D conversion. They have all the inherent advantages of the voltage-to-frequency conversion technique. The Output of NJM4151 is a series of pulses of constant duration. The frequency of the pulses is proportional to the applied input voltage. These converters are designed for use in a wide range of data conversion and remote sensing applications.

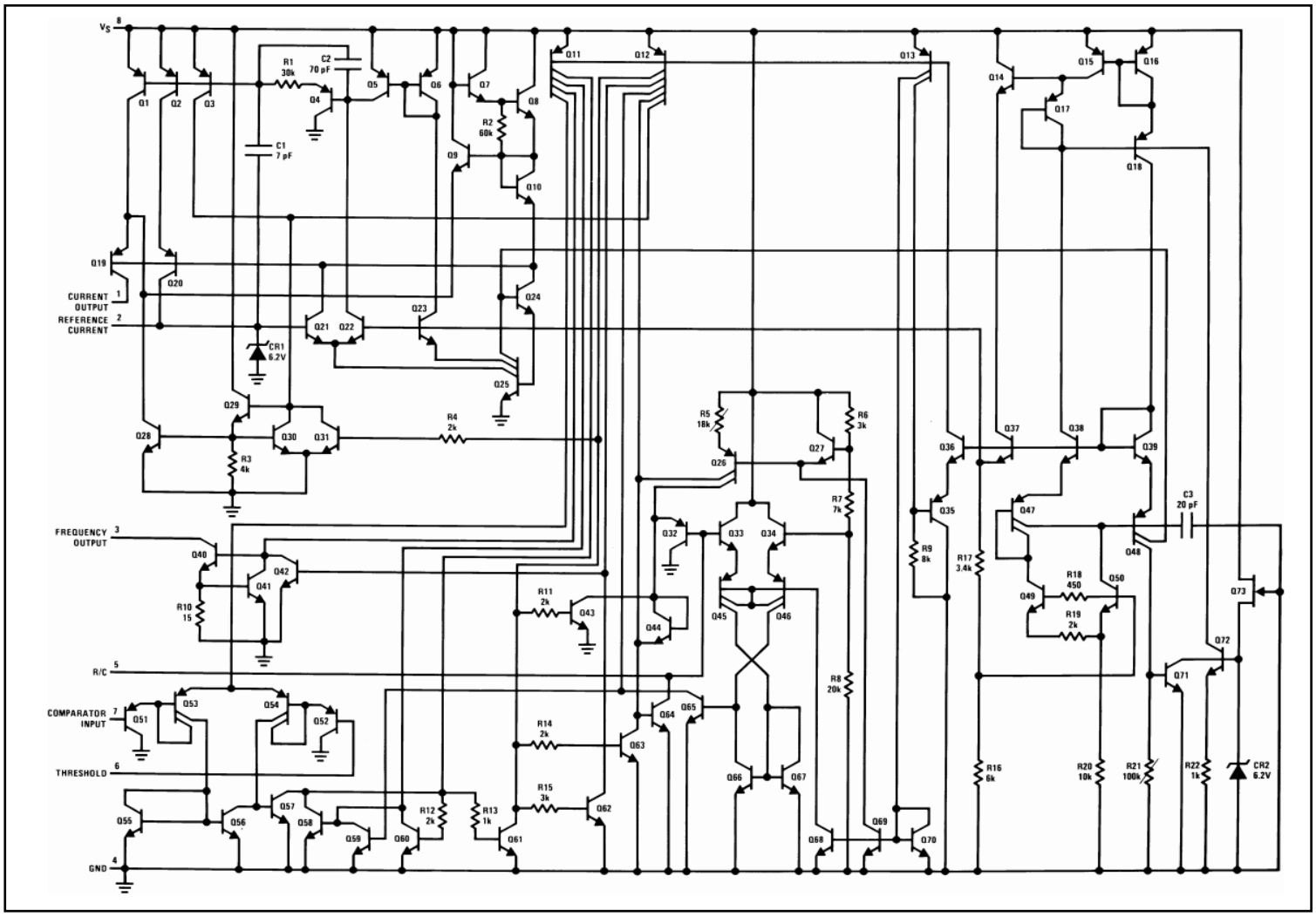
Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
NJM4151M-TE1-TUDI	SOP8	Tape,Reel,2500	4151M	-40℃ to 85℃
NJM4151D-TUDI	DIP8	Tube,50,A box of 2000	4151D	

Pin description

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

Schematic Diagram



Standard Test Circuit and Applications Circuit, Precision Voltage -to-Frequency Converter

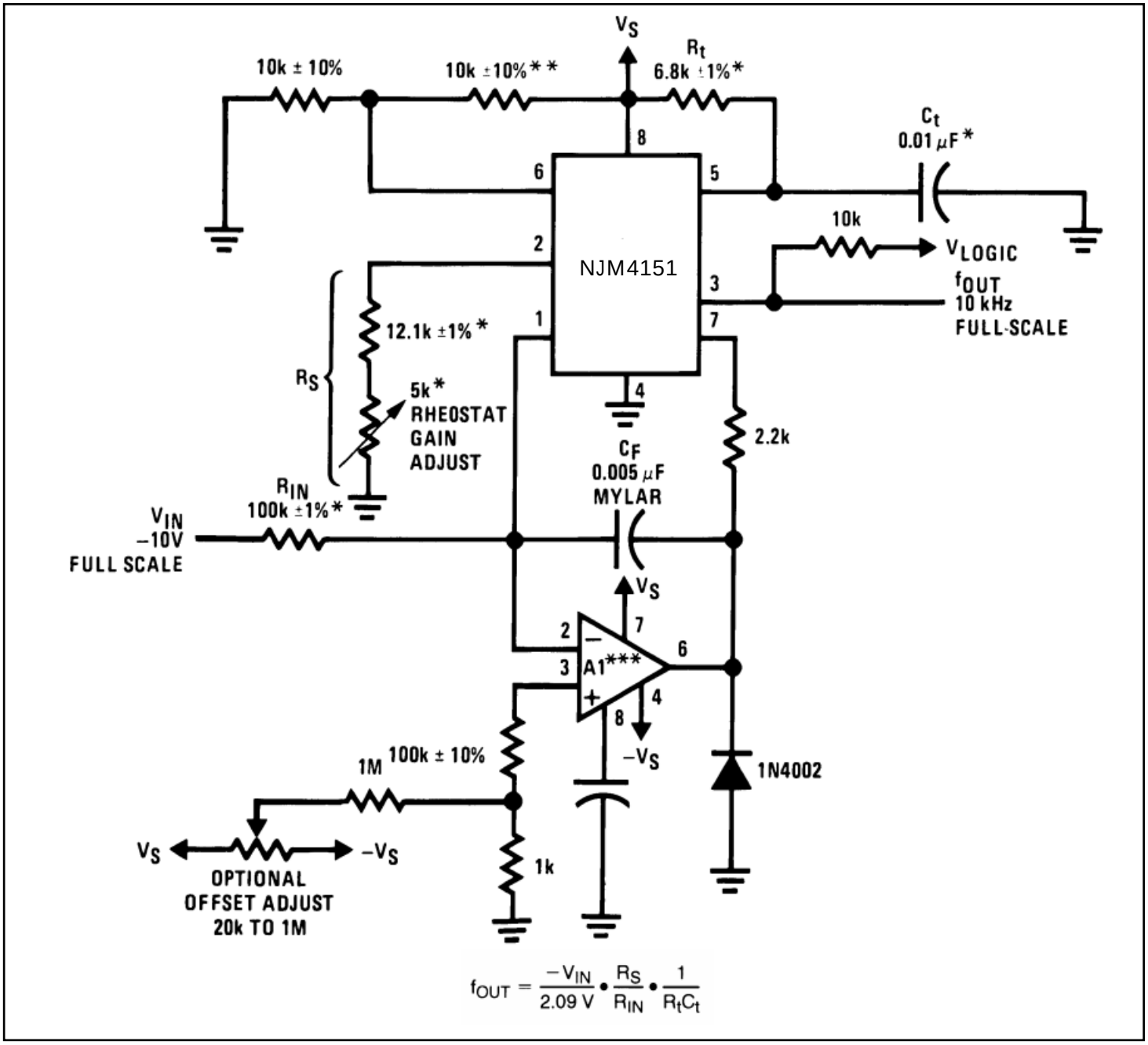


Figure 3. Standard Test Circuit and Applications Circuit, Precision Voltage-to-Frequency Converter

*Use stable components with low temperature coefficients.
**This resistor can be 5 kΩ or 10 kΩ for V_S = 8 V to 22 V, but must be 10 kΩ for V_S = 4.5 V to 8 V.
***Use low offset voltage and low offset current op-amps for A1: recommended type LF411A

Functional Block Diagram

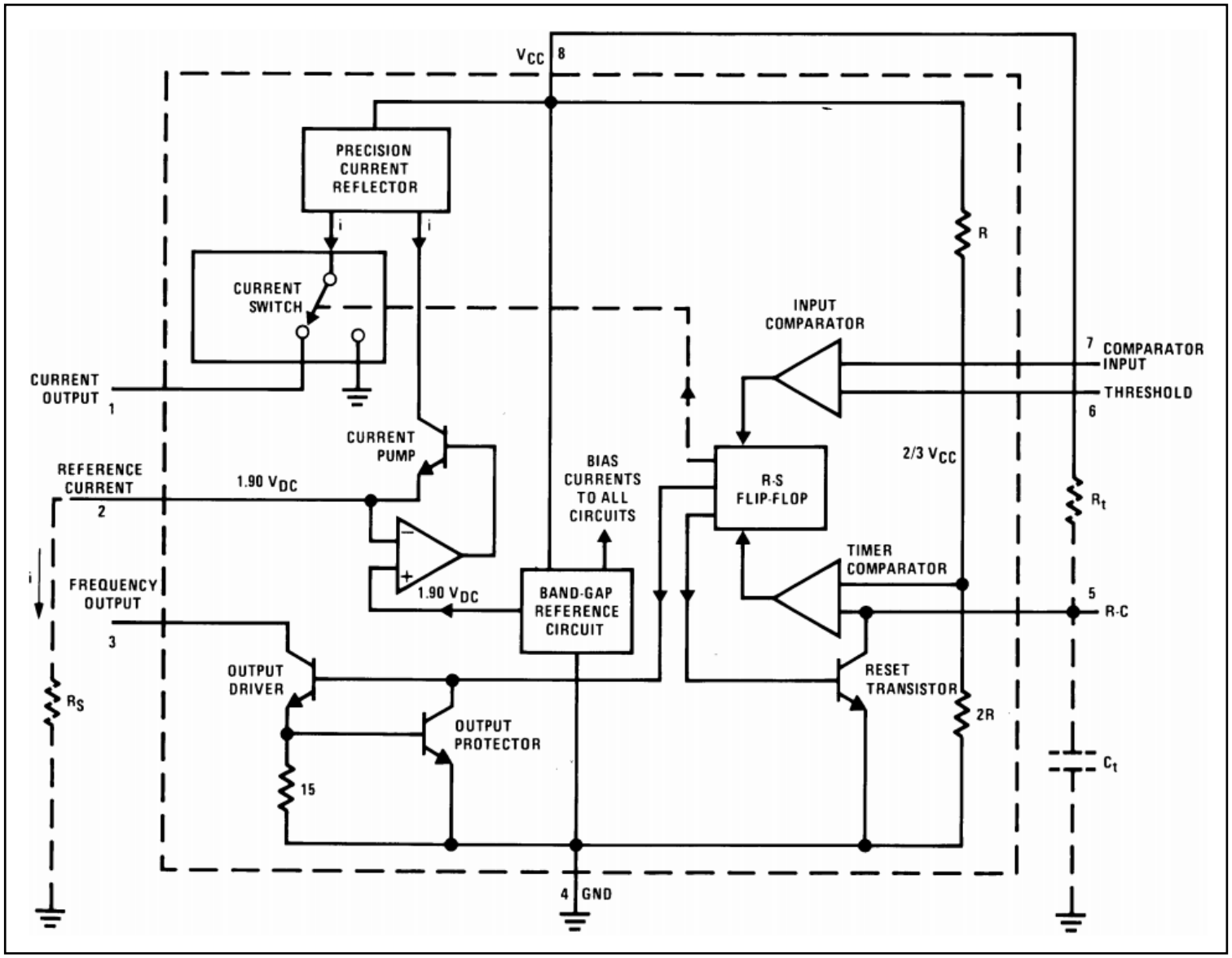


Figure 2. **Functional Block Diagram**

Dissipation Ratings

	VALUE	UNIT
Package Dissipation at 25°C	1.25	W

The absolute maximum junction temperature ($T_J$max) for this device is 150°C. The maximum allowable power dissipation is dictated by $T_J$max, the junction-to-ambient thermal resistance (θ_{JA}), and the ambient temperature T_A, and can be calculated using the formula $P_D$max = ($T_J$max - T_A) / θ_{JA}. The values for maximum power dissipation will be reached only when the device is operated in a severe fault condition (e.g., when input or output pins are driven beyond the power supply voltages, or the power supply polarity is reversed). Obviously, such conditions should always be avoided.

Absolute Maximum Ratings

		MIN	MAX	UNIT
Supply Voltage,Vs			40	V
Output Short Circuit to Ground		Continuous		
Output Short Circuit to Vcc		Continuous		
Input Voltage		-0.2	+Vs	V
Lead Temperature (Soldering,10 sec.)	PDIP		260	℃

Note:
(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) All voltages are measured with respect to GND = 0 V, unless otherwise noted.
(3) If Military/Aerospace specified devices are required, please contact the TI Sales Office/Distributors for availability and specifications.

ESD Ratings

		VALUE	UNIT
$V_{(ESD)}$ Electrostatic discharge	Human body model (HBM),per ANSIESDAJEDEC JS-001	±500	V

Note:
(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) Human body model, 100 pF discharged through a 1.5-kΩ resistor.

Recommended Operating Conditions

		MIN	MAX	UNIT
Operating Ambient Temperature	NJM4151	-40~ 85		℃
				℃
Supply Voltage,Vs(1)		4	40	V

All voltages are measured with respect to GND = 0 V, unless otherwise noted.

Thermal Information

THERMAL METRIC		NJM4151	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	100	CN

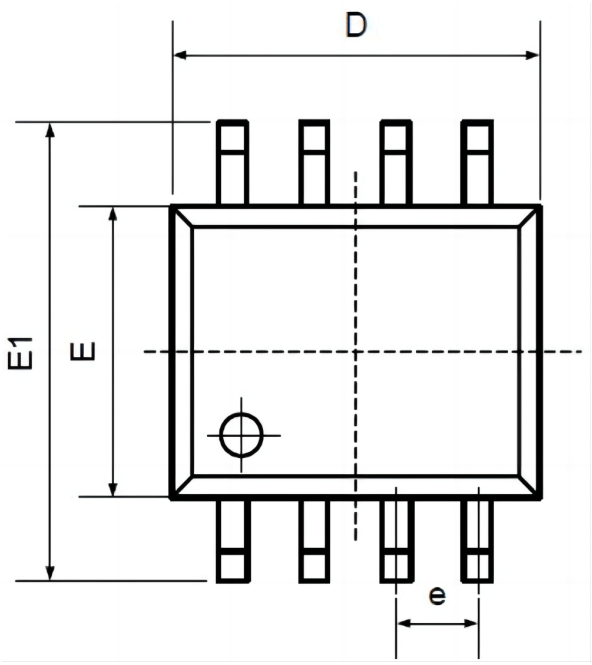
Electrical Characteristics

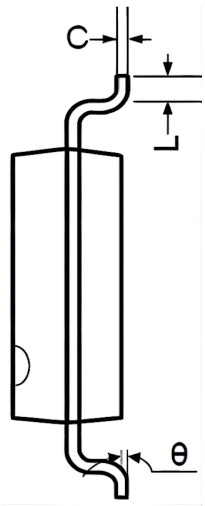
All specifications apply in the circuit of Figure 3, with 4.0 V VS 40 V, TA = 25°C, unless otherwise specified.

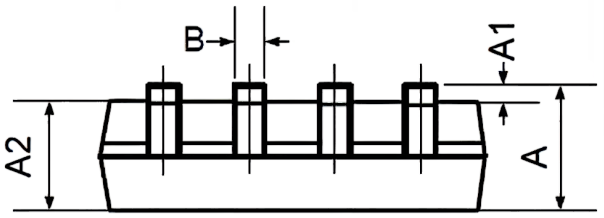
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
VFC Non-Linearity(1)		4.5V≤Vs≤20V		±0.003	±0.01	%Full-Scale
		TMIN≤TA≤TMAX		±0.006	±0.02	%Full-Scale
VFC Non-Linearity		Vs=15V,f=10 Hz to 11 kHz		±0.024	±0.14	%Full-Scale
Conversion Accuracy	NJM4151	VIn=-10V,Rs=14kΩ	0.95	1	1.05	kHzN
Temperature Stability		TMIN≤TA≤TMAX		±30	±150	ppm/℃
Change of Gain with Vs		4.5V≤Vs≤10V		0.01	0.1	%/N
		10V≤Vs≤40V		0.006	0.06	%N
Rated Ful-Scale Frequency		VIn=-10V	10.0			kHz
Gain Stability vs.Time(1000 Hours)		TMIN≤TA≤TMAX		±0.02		%Full-Scale
Over Range(Beyond Full-Scale)Frequency		VIN=-11V	10%			
INPUT COMPARATOR						
Offset Voltage				±3	±10	mV
		TMIN≤TA≤TMAX		±3	±10	mV
Bias Current				-80	-300	nA
Offset Current				±8	±100	nA
Common-Mode Range		TMIN≤TA≤TMAX		-0.2	Vcc-2	V
TIMER						
Timer Threshold Voltage,Pin 5			0.63×Vs	0.667×V	0.7×Vs	
Input Bias Current,Pin 5		Vs=15V				
All Devices		OV≤VPIN 5≤9.9V		±10	±100	nA
NJM4151		VPIN 5=10V		200	500	nA
VSAT PIN 5(Reset)		I=5mA		0.22	0.5	V
SUPPLY CURRENT						
NJM4151		Vs=5V		2	3 4	mA
		Vs=40V		2.5	4 6	mA
CURRENT SOURCE(PIN 1)						
Output Current	NJM4151	Rs=14kΩ,VPIN 1=0		126	135 144	μA
Change with Voltage		OV≤VPIN 1≤10V			0.2 1	μA
Current Source OFF Leakage	NJM4151				0.02 10	nA
	All Devices	TA=TMAX			2 50	nA
Operating Range of Current(Typical)			(10 to 500)			μA
REFERENCE VOLTAGE(PIN 2)						
NJM4151				1.76	1.89 2.02	Voc
Stability vs.Temperature				±60		ppm/℃
Stability vs.Time,1000 Hours				±0.1%		
LOGIC OUTPUT(PIN 3)						
VsAT		I=5mA			0.15 0.5	V
		I=3.2 mA(2 TTL Loads),			0.1 0.4	V
OFF Leakage					±0.05 1	μA

Non-linearity is defined as the deviation of f_{OUT} from V_{IN} × (10 kHz/-10 V_{DC}) when the circuit has been trimmed for zero error at 10 Hz and at 10 kHz, over the frequency range 1 Hz to 11 kHz. For the timing capacitor, C_T, use NPO ceramic, Teflon®, or polystyrene.

Package SOP8

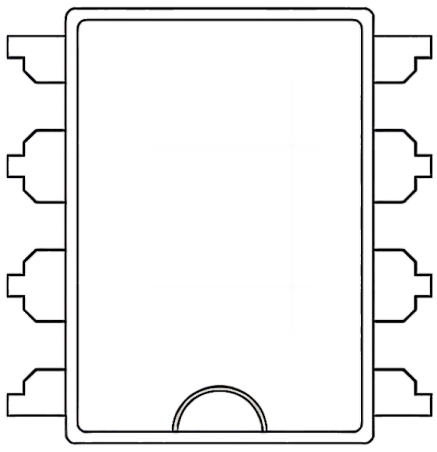


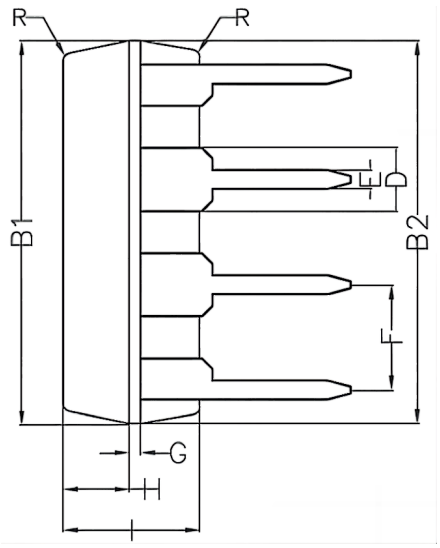


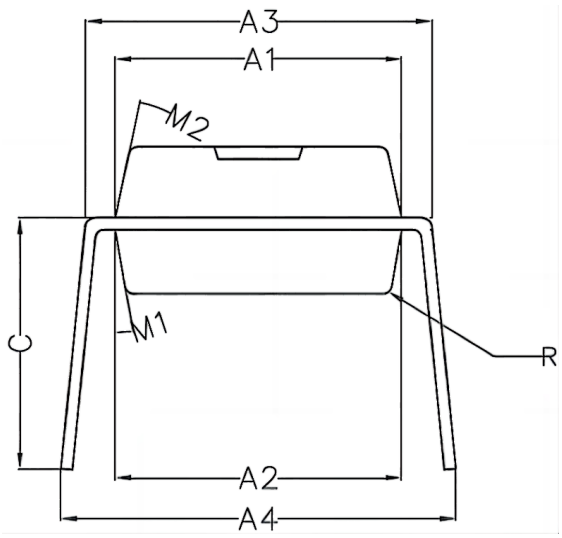


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Package DIP8







Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25
B2	9.20	9.25	9.30
C		5.57	
D		1.52	
E	0.43	0.45	0.47
F		2.54	
G		0.25	
H	1.54	1.59	1.64
工	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°

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