



PRODUCT NAME : LM34 Precision Fahrenheit Temperature Sensors for Arduino/Raspberry-Pi/Robotics

PRICE : Rs 49.00

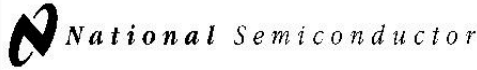
SKU : RM1930



DESCRIPTION

Features

- Frequency to Voltage Converter with High Gain Op-Amp/Comparator
- Ground Referenced Tachometer Input Interfaces Directly with Magnetic Pickups
- Op Amp/Comparator has Floating Transistor Output
- 50mA Sink or Source Current to Operate Relays
- Frequency Doubling for Low Ripple



July 1999

LM34 Precision Fahrenheit Temperature Sensors

General Description

The LM34 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Fahrenheit temperature. The LM34 thus has an advantage over linear temperature sensors calibrated in degrees Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Fahrenheit scaling. The LM34 does not require any external calibration or trimming to provide typical accuracies of $\pm 1/2^\circ\text{F}$ at room temperature and $\pm 1 1/2^\circ\text{F}$ over a full -50 to $+300^\circ\text{F}$ temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM34's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies or with plus and minus supplies. As it draws only $75\ \mu\text{A}$ from its supply, it has very low self-heating, less than 0.2°F in still air. The LM34 is rated to operate over a -50 to $+300^\circ\text{F}$ temperature range, while the LM34C is rated for a -40 to $+230^\circ\text{F}$ range (0°F with improved accuracy). The LM34 series is available packaged in

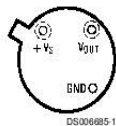
hermetic TO-46 transistor packages, while the LM34C, LM34CA and LM34D are also available in the plastic TO-92 transistor package. The LM34D is also available in an 8-lead surface mount small outline package. The LM34 is a complement to the LM35 (Centigrade) temperature sensor.

Features

- Calibrated directly in degrees Fahrenheit
- Linear $+10.0\ \text{mV}/^\circ\text{F}$ scale factor
- 1.0°F accuracy guaranteed (at $+77^\circ\text{F}$)
- Rated for full -50 to $+300^\circ\text{F}$ range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 5 to 30 volts
- Less than $90\ \mu\text{A}$ current drain
- Low self-heating, 0.18°F in still air
- Nonlinearity only $\pm 0.5^\circ\text{F}$ typical
- Low-impedance output, $0.4\ \Omega$ for $1\ \text{mA}$ load

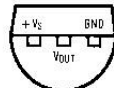
Connection Diagrams

**TO-46
Metal Can Package
(Note 1)**



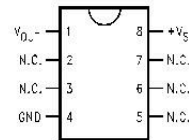
Order Numbers LM34H,
LM34AH, LM34CH,
LM34CAH or LM34DH
See NS Package
Number H03H

**TO-92
Plastic Package**



Order Number LM34CZ,
LM34CAZ or LM34DZ
See NS Package
Number Z03A

**SO-8
Small Outline
Molded Package**



N.C. = No Connection

Top View
Order Number LM34DM
See NS Package Number M08A

Note 1: Case is connected to negative pin (GND).

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Absolute Maximum Ratings (Note 11)		TO-46 Package		TO-92 Package		SO Package (Note 13)		Specified Operating Temp. Range (Note 3)	
If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.		(Soldering, 10 seconds)		(Soldering, 10 seconds)		Vapor Phase (60 seconds)		Specified Operating Temp. Range (Note 3)	
Supply Voltage	+35V to -0.2V					Infrared (15 seconds)			
Output Voltage	+6V to -1.0V								
Output Current	10 mA								
Storage Temperature,									
TO-46 Package	-76°F to +356°F							T_{MIN} to T_{MAX}	
TO-92 Package	-76°F to +300°F							-50°F to +300°F	
SO-8 Package	-65°C to +150°C							-40°F to +230°F	
ESD Susceptibility (Note 12)	800V							+32°F to +212°F	
Lead Temp.									

DC Electrical Characteristics (Notes 2, 7)								
Parameter	Conditions	LM34A			LM34CA			Units (Max)
		Typical	Tested Limit (Note 5)	Design Limit (Note 6)	Typical	Tested Limit (Note 5)	Design Limit (Note 6)	
Accuracy (Note 8)	T _A = +77°F	±0.4	±1.0		±0.4	±1.0		°F
	T _A = 0°F	±0.6			±0.6		±2.0	°F
	T _A = T _{MAX}	±0.8	±2.0		±0.8	±2.0		°F
	T _A = T _{MIN}	±0.8	±2.0		±0.8		±3.0	°F
Nonlinearity (Note 9)	T _{MIN} ≤ T _A ≤ T _{MAX}	±0.35		±0.7	±0.30		±0.6	°F
Sensor Gain (Average Slope)	T _{MIN} ≤ T _A ≤ T _{MAX}	+10.0	+9.9, +10.1		+10.0		+9.9, +10.1	mV/°F, min mV/°F, max
Load Regulation (Note 4)	T _A = +77°F	±0.4	±1.0		±0.4	±1.0		mV/mA
	T _{MIN} ≤ T _A ≤ T _{MAX} 0 ≤ I _L ≤ 1 mA	±0.5		±3.0	±0.5		±3.0	mV/mA
Line Regulation (Note 4)	T _A = +77°F	±0.01	±0.05		±0.01	±0.05		mV/V
	5V ≤ V _S ≤ 30V	±0.02		±0.1	±0.02		±0.1	mV/V
Quiescent Current (Note 10)	V _S = +5V, +77°F	75	90		75	90		μA
	V _S = +5V	131		160	116		139	μA
	V _S = +30V, +77°F	76	92		76	92		μA
	V _S = +30V	132		163	117		142	μA
Change of Quiescent Current (Note 4)	4V ≤ V _S ≤ 30V, +77°F	+0.5	2.0		0.5	2.0		μA
	5V ≤ V _S ≤ 30V	+1.0		3.0	1.0		3.0	μA
Temperature Coefficient of Quiescent Current		+0.30		+0.5	+0.30		+0.5	μA/°F
Minimum Temperature for Rated Accuracy	In circuit of Figure 1, I _L = 0	+3.0		+5.0	+3.0		+5.0	°F
Long-Term Stability	T _J = T _{MAX} for 1000 hours	±0.16			±0.16			°F

Note 2: Unless otherwise noted, these specifications apply: -50°F ≤ T_J ≤ +300°F for the LM34 and LM34A; -40°F ≤ T_J ≤ +230°F for the LM34C and LM34CA; and +32°F ≤ T_J ≤ +212°F for the LM34D. V_S = +5 Vdc and I_{LOAD} = 50 μA in the circuit of Figure 2; +6 Vdc for LM34 and LM34A for 230°F ≤ T_J ≤ 300°F. These specifications also apply from +5°F to T_{MAX} in the circuit of Figure 1.

Note 3: Thermal resistance of the TO-46 package is 720°F/W junction to ambient and 43°F/W junction to case. Thermal resistance of the TO-92 package is 324°F/W junction to ambient. Thermal resistance of the small outline molded package is 400°F/W junction to ambient. For additional thermal resistance information see table in the Typical Applications section.

Note 4: Regulation is measured at constant junction temperature using pulse testing with a low duty cycle. Changes in output due to heating effects can be computed by multiplying the internal dissipation by the thermal resistance.

Note 5: Tested limits are guaranteed and 100% tested in production.

Note 6: Design limits are guaranteed (but not 100% production tested) over the indicated temperature and supply voltage ranges. These limits are not used to calculate outgoing quality levels.

Note 7: Specification in **BOLDFACE TYPE** apply over the full rated temperature range.

