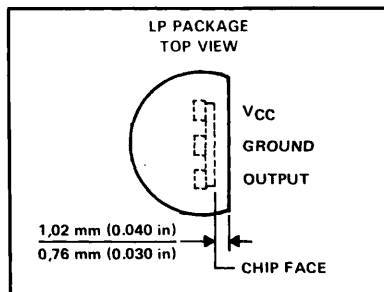


TL173I, TL173C LINEAR HALL-EFFECT SENSORS

D2526, MARCH 1979—REVISED APRIL 1988

- Output Voltage Linear with Applied Magnetic Field
- Sensitivity Constant Over Wide Operating Temperature Range
- Solid-State Technology
- Three-Terminal Device
- Senses Static or Dynamic Magnetic Fields

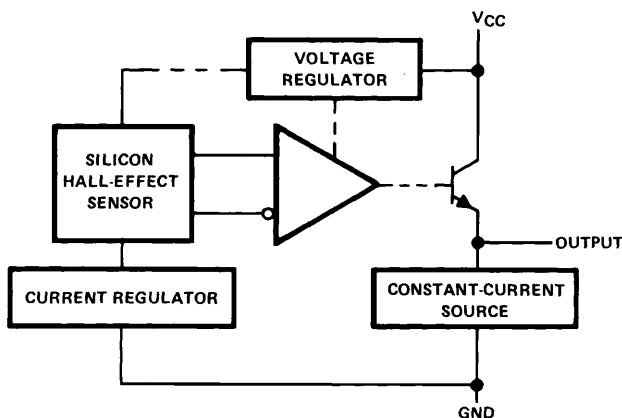


description

The TL173I and TL173C are low-cost magnetic-field sensors designed to provide a linear output voltage proportional to the magnetic field they sense. These monolithic circuits incorporate a Hall element as the primary sensor along with a voltage reference and a precision amplifier. Temperature stabilization and internal trimming circuitry yield a device that features high overall sensitivity accuracy with less than 5% error over its operating temperature range.

The TL173I is characterized for operation from -20°C to 85°C . The TL173C is characterized for operation from 0°C to 70°C .

functional block diagram



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1)	25 V
Continuous total dissipation at (or below) 25°C free-air temperature (see Note 2)	775 mW
Operating free-air temperature range: TL173I	-20°C to 85°C
TL173C	0°C to 70°C
Storage temperature range	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C
Magnetic flux density	unlimited

NOTES: 1. Voltage values are with respect to network ground terminal.

2. For operation above 25°C free-air temperature, derate linearly at the rate of $6.2 \text{ mW}/^{\circ}\text{C}$.

4

Special Functions

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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TL173I, TL173C LINEAR HALL-EFFECT SENSORS

recommended operating conditions

	TL173I			TL173C			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	10.8	12	13.2	10.8	12	13.2	V
Magnetic flux density, B	±50			±50			mT
Output current, I_O	Sink			0.5			mA
	Source			-2			
Operating free-air temperature, T_A	-20	85		0	70		°C

electrical characteristics over full range of recommended operating conditions (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	MIN	TYP‡	MAX	UNIT	
V_O Output voltage	$I_O = -2$ mA to 0.5 mA,	5.8	6	6.2	V	
k_{SVS} Supply voltage sensitivity ($\Delta V_O/\Delta V_{CC}$)	$B = 0$ mT§, $T_A = 25^\circ\text{C}$	18			mV/V	
S Magnetic sensitivity ($\Delta V_O/\Delta B$)	$B = -50$ to 50 mT§, $T_A = 25^\circ\text{C}$	13.5	15	18	V/T§	
ΔS Magnetic sensitivity change with temperature	$\Delta T_A = 25^\circ\text{C}$ to MIN or MAX	±5			%	
I_{CC} Supply current	$B = 0$ mT§, $I_O = 0$	8			12	mA
f_{max} Maximum operating frequency		100			kHz	

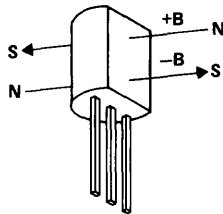
† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ Typical values are at $V_{CC} = 12$ V and $T_A = 25^\circ\text{C}$.

§ The unit of magnetic flux density in the International System of Units (SI) is the tesla (T). The tesla is equal to one weber per square meter. Values expressed in milliteslas may be converted to gauss by multiplying by ten, e.g., 50 millitesla = 500 gauss.

4

Special Functions



The north pole of a magnet is the pole that is attracted by the geographical north pole. The north pole of a magnet repels the north-seeking pole of a compass. By accepted magnetic convention, lines of flux emanate from the north pole of a magnet and enter the south pole.

FIGURE 1. DEFINITION OF MAGNETIC FLUX POLARITY

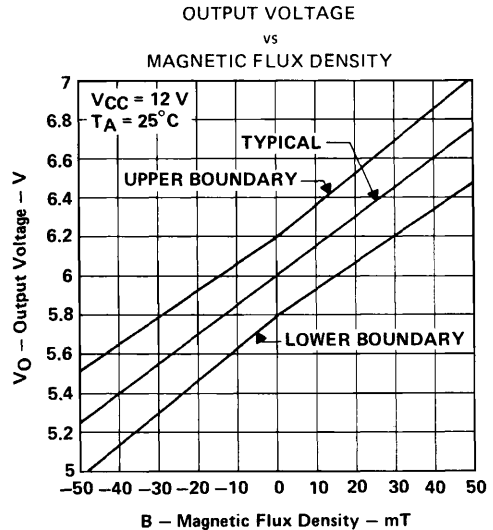


FIGURE 2

TYPICAL APPLICATION DATA

The circuit in Figure 3 may be used to set the output voltage at zero field strength to exactly 6 V (using R1), and to set the sensitivity to exactly -15 V/T (using R2), as depicted in Figure 4.

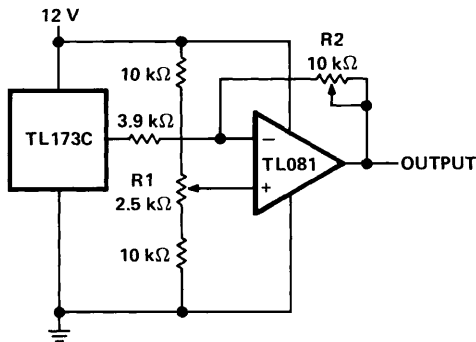


FIGURE 3. COMPENSATION CIRCUIT

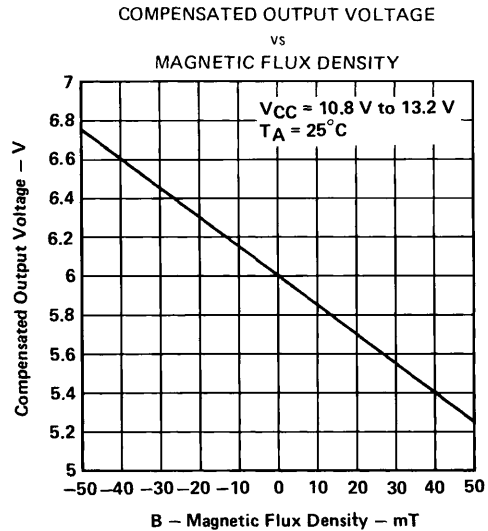


FIGURE 4