

# TL172C NORMALLY OFF SILICON HALL-EFFECT SWITCH

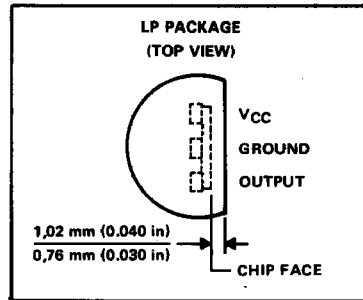
D2490, AUGUST 1977—REVISED APRIL 1988

- Magnetic-Field Sensing Hall-Effect Input
- On-Off Hysteresis
- Small Size
- Solid-State Technology
- Open-Collector Output
- Normally Off Switch

## description

The TL172C is a low-cost magnetically operated normally off electronic switch that utilizes the Hall Effect to sense the presence of a magnetic field. Each circuit consists of a Hall-Effect sensor, signal conditioning and hysteresis functions, and an output transistor integrated into a monolithic chip. A magnetic field of sufficient strength in the positive direction will cause the TL172C output to be in a low-impedance state. Otherwise, the output will present a high impedance. The output of this circuitry connected to many different types of electronic components.

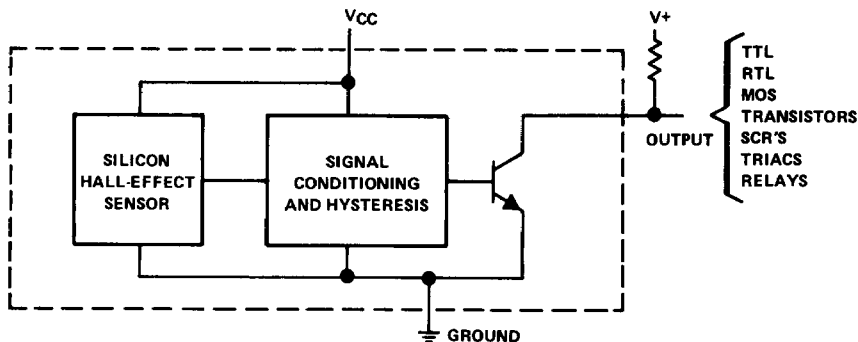
The TL172C is characterized for operation over the temperature range of 0°C to 70°C.



FUNCTION TABLE

FLUX DENSITY	OUTPUT
$\leq 10 \text{ mT}$	Off
$10 \text{ mT} < B < 60 \text{ mT}$	Undefined
$\geq 60 \text{ mT}$	On

## functional block diagram



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Special Functions

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

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Output voltage	30 V
Output current	20 mA
Operating free-air temperature range	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

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

electrical characteristics over rated operating free-air temperature range,  $V_{CC} = 5 V \pm 5\%$  (unless otherwise noted)

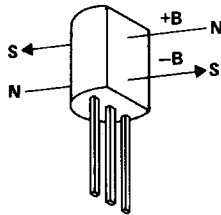
PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$B_{T+}$	Threshold of positive-going magnetic flux density <sup>†</sup>			60	mT‡
$B_{T-}$	Threshold of negative-going magnetic flux density <sup>†</sup>	10			mT‡
$B_{T+} - B_{T-}$	Hysteresis		23		mT‡
$I_{OH}$	High-level output current	$V_{OH} = 20 V$		100	$\mu A$
$V_{OL}$	Low-level output voltage	$V_{CC} = 4.75 V$ , $I_{OL} = 16 mA$		0.4	V
$I_{CC}$	Supply current	$V_{CC} = 5.25 V$		6	mA

<sup>†</sup>Threshold values are those levels of magnetic flux density at which the output changes state. For the TL172C, a level more positive than  $B_{T+}$  causes the output to go to a low level, and a level more negative than  $B_{T-}$  causes the output to go to a high level. See Figures 1 and 2.

<sup>‡</sup>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.

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### 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

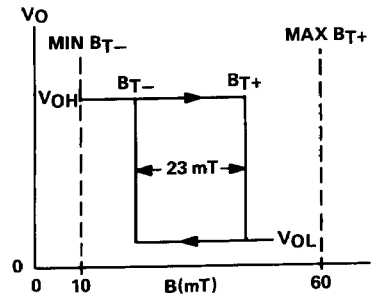


FIGURE 2. REPRESENTATIVE CURVE OF  $V_O$  vs B