Dual-Channel Quadrature Hall-Effect Bipolar Switch

◆ General Description

The DH423 is a dual¨Coutput-channel, bipolar switch with each channel comprising a separate complete Hall-effect circuit with dedicated Hall element and separate digital output for speed and direction signal processing capability. The independent Hall elements (E1 integrated with OUTPUT1, and E2 integrated with OUTPUT2) are photo-lithographically aligned to better than 1.0μm. Maintaining this accurate mechanical location between the two active Hall elements eliminates the major manufacturing hurdle encountered in fine-pitch detection applications. The DH423 is a highly sensitive, temperature-stable magnetic device, which is ideal for use in ring magnet-based speed and direction sensing systems used in harsh automotive and industrial environments.

The DH423 contains two indepe ndent Hall effect switches, and has a monolithic IC that accurately locates the two Hall elements, E1 and E2, approximately 0.95mm apart. The digital outputs are 90º out of phase so that the outputs are in quadrature, with the proper ring magnet design. This allows for easy processing of speed and direction signals.

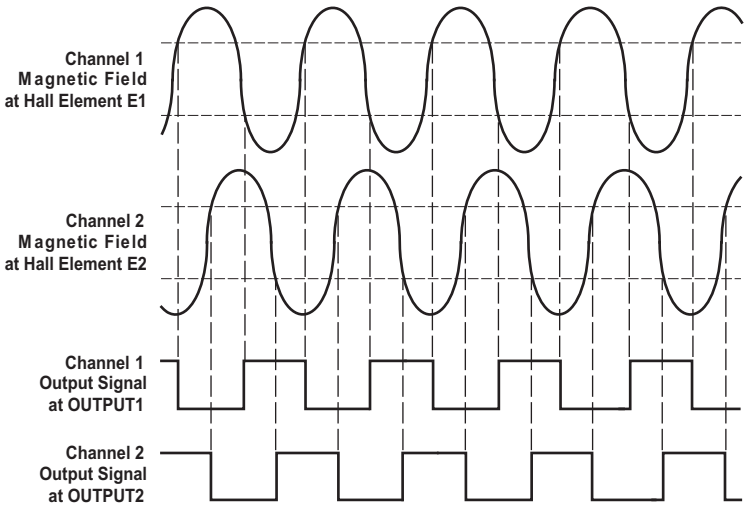
◆ Features

- Two matched Hall effect switches on a single substrate.
- Wide operating voltage range: 3.8V~30V
- Open Collector Pre-Driver
- Maximum output sink current: 50mA
- Chip Power Reverse-Connection Protection
- Operating Temperature: -40℃~+150℃
- Package: SIP-4L(TO-94)

◆ Applications

- Rotor Position Sensing
- Current Switch
- Encoder
- RPM Detection
- Brush-less DC Motor
- Brush-less DC Fan
- Revolution counting
- Speed and Direction measurement

◆ Typical Application



Quadrature output signal configuration. The outputs of the two output channels have a phase difference of 90º when used with a properly designed magnet that has an optimal pole pitch of twice the Hall element spacing of 0.95 mm.

Fig.1 Typical Application of GH1423 for Speed and Direction detector.

◆ Absolute Maximum Rating

SYMBOL	PARAMETER	RATING
VCC	Supply Voltage	-30V to +40VDC
Vout (off)	Voltage externally applied to output	+40VDC max, OFF condition only -0.5 V min., OFF or ON condition
Io (sink)	Output "ON" Current	50 mA
PD	Power Dissipation	450 mW (SIP-4L)
Top	Operation Temperature Range	-40 to +150 ℃
Tst	Storage Temperature Range	-65 to +150 ℃
B	Magnetic Flux	No limit.

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

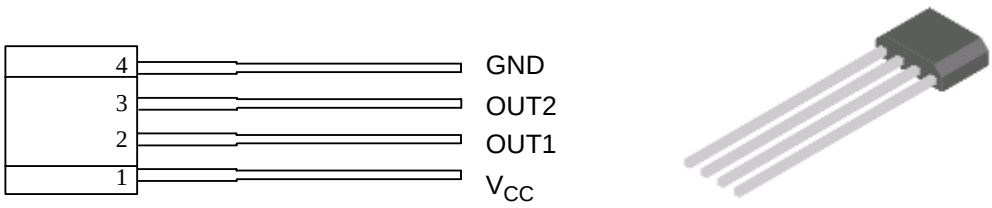
◆ Pin Description

PIN #	NAME	P/I/O	FUNCTION DESCRIPTION
1	VCC	P	Input Power Supply
2	OUT1	O	Output Stage of Open Collector
3	OUT2	O	Output Stage of Open Collector
4	GND	P	Ground

◆ Pin Configuration

SIP-4L(TO-94)

(Top View)



◆ Functional Block Diagram

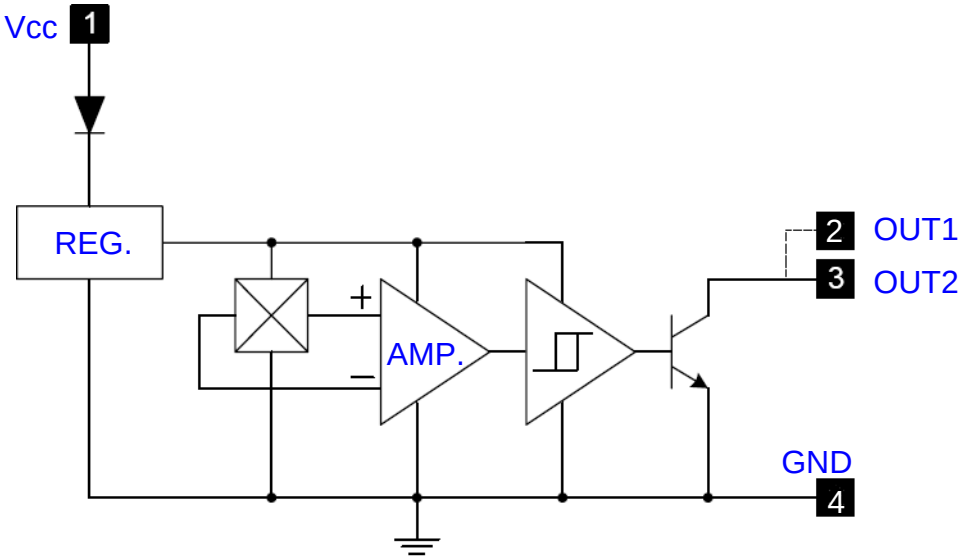


Figure 2. Function Block Diagram of GH1423

◆ Electrical Characteristics (TA = 25℃)

SYMBOL	PARAMETER		CONDITIONS	MIN.	TYP.	MAX.	UNIT
Vcc	Supply Voltage		Operating	3.8		30	V
$V_{O\ (SAT)}$	Output Saturation Voltage		Vcc = 12V, OUT "ON", Io = 25mA		100	250	mV
			Vcc = 12V, OUT "ON", Io = 50mA		200	650	mV
Icc	Supply Current		Vcc = 4V~28V, OUT "OFF"		6.5	12	mA
I_{LE}	Output Leakage Current (Leakage into sensor output)		Released			10	μA
Tr	Output Switching Time	Rise Time	RL=820Ω, CL=20pF		0.2		μS
Tf		Fall Time	RL=820Ω, CL=20pF		0.5		μS

◆ Test Circuit

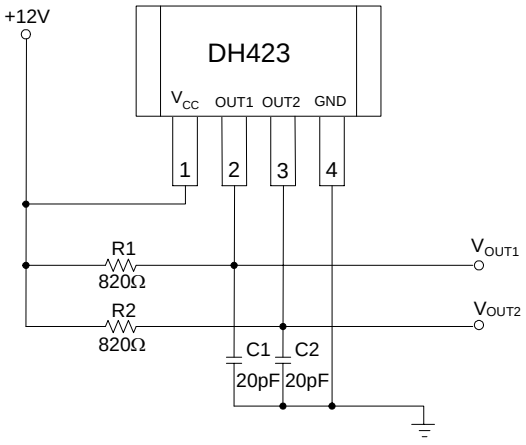


Fig 3. Test Circuit

◆ Magnetic Characteristics (TA = 25℃, VCC = 12V)

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Bop	Operation Point		-	120	Gauss
Brp	Release Point	-120	-		Gauss
Bhy	Hysteresis		80		Gauss

◆ Operating Characteristics

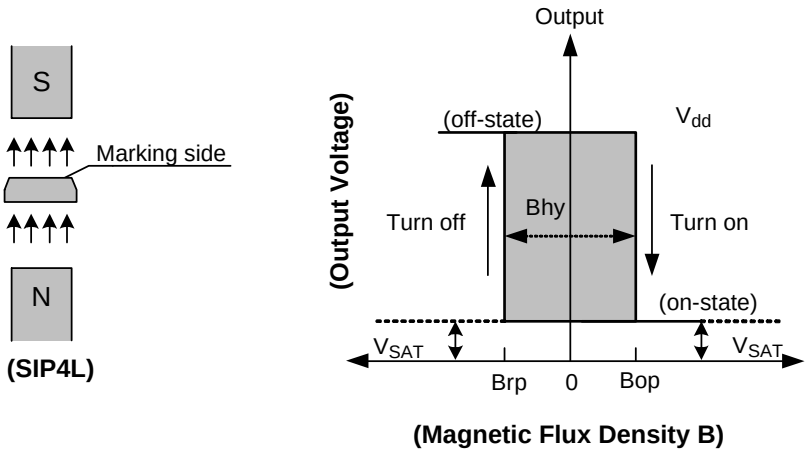
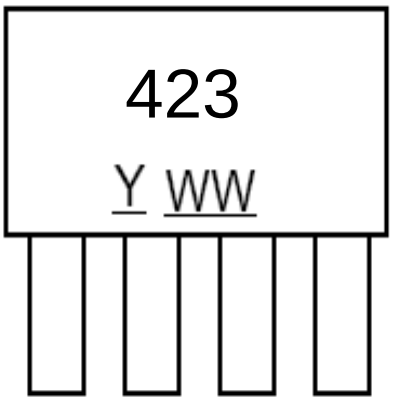


Figure 4. Operating Characteristics of GH1423

◆ Marking Information

(Top View) SIP-4L(TO-94)



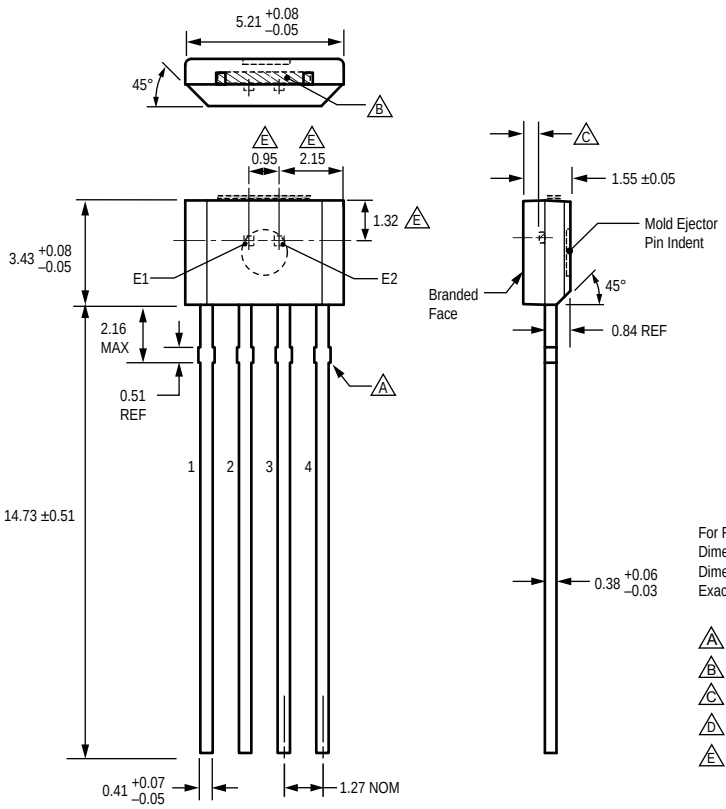
Y : Year : "8" = 2008

WW : Nth Week 01~52

◆ Package Information

Package Type: SIP-4L(TO-94) for Bulk pack

SIP-4L(TO-94) **Unit: mm**



For Reference Only; not for tooling use (reference DWG-9010)
Dimensions in millimeters
Dimensions exclusive of mold flash, gate burrs, and dambar protrusions
Exact case and lead configuration at supplier discretion within limits shown

A Dambar removal protrusion (8X)
B Gate and tie bar burr area
C Active Area Depth, 0.43 mm REF
D Branding scale and appearance at supplier discretion
E Hall elements (E1 and E2); not to scale