4.5-24V V_{DD} Hall Effect Sensor

1. Description

The ES44EUA is small, versatile digital Hall-effect devices that are operated by the magnetic field from a permanent magnet or an electromagnet.

These unipolar sensors are designed to meet the requirements of a wide range of potential applications. These economical unipolar sensors are well suited for simple, high-volume, cost-sensitive position and motion sensing applications.

The 4.5Vdc to 24Vdc supply voltage range allows this device to be used in very wide voltage applications.

2. Features

- Wide operating voltage range: 4.5V to 24V
- Built-in reverse voltage protecting capability
- RoHS-compliant material meets directive 2011/65/EU
- Robust design: will operate up to 85°C
- Package: T0-92S package
- Unipolar respond to a single pole: North (AT) or South (A,BT and ET),making these products well-suited for shift selectors, wiper end/home position, door ajar/open, and vane-interrupt systems etc.

3. Applications

- Speed and RPM sensing
- Door or lid closure detection
- Flow-rate sensing
- Printer head position sensing
- Robotics control
- Medication bin monitor on portable drug carts

4. Package Information

Part Number	Marking	Description
ES44EUA	44E	Flat, TO-92S package, bulk packing (1000 units per bag)

Table-1 Package Information

5. Pin Configuration and Functions

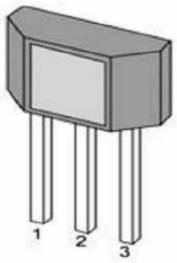
Name	Number	Description	Outline
VDD	1	Supply Voltage pin	
GND	2	Ground pin	
OUT	3	Collector Output pin	

Table-2 Pin configuration

6. Specification

6.1 Absolute Maximum rating

Over operating free-air temperature range (unless otherwise noted)

Parameter	Symbol	Min	Max	Units
Supply Voltage	V_{DD}		24	V
VDD Reverse Voltage VDD	V_{RDD}		-24	V
Output Voltage	V_{OUT}		24	V
Output Current	I_{OUT}		50	mA
Operating Ambient Temperature	T_A	-40	85	℃
Storage Temperature	Ts	-65	170	℃
Magnetic Flux	B	No Limit		Gauss

Table-3 Absolute Maximum rating

6.2 ESD Protection

Parameter	Value	Unit
HBM (human body mode, C=100pF, R=1.5 kohm)	+/-4000	V

Table-4 ESD Protection

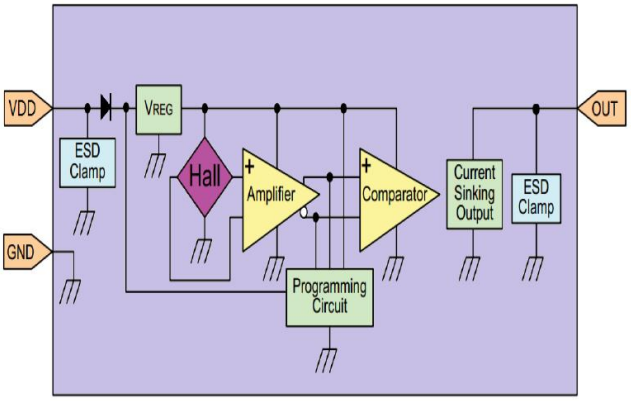
6.3 Electric Characteristics

(At 4.5V to 24V supply, 20mA load, TA= -40˚C to 85˚C)

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
V_{DD}	Supply voltage	-40˚C to 85˚C	4.5		24	V
I_{DD}	Supply Current	V_{DD} = 12V		4.0	10	mA
V_{DSon}	Output saturation voltage	at 20mA, Gauss >Bop			0.4	V
I_{OFF}	Output Leakage Current	B<Brp			10	uA
T_R	Output rise time	V_{DD} =12V at 25˚C C_L= 20pF			1.5	us
T_F	Output fall time	V_{DD}=12V at 25˚C C_L= 20pF			1.5	us
B_{OP}	Magnetic operating point	TA=25˚C	70		240	Gauss
B_{RP}	Magnetic release point	TA=25˚C	50		220	Gauss
B_{HYST}	Magnetic hysteresis window	T_A=25°C $\|B_{OP}-B_{RP}\|$	30	55	80	Gauss
T	Operating temperature		-40		85	˚C
Ts	Storage temperature:		-65		170	˚C

Table-5 Electric Characteristics

7. Typical Application

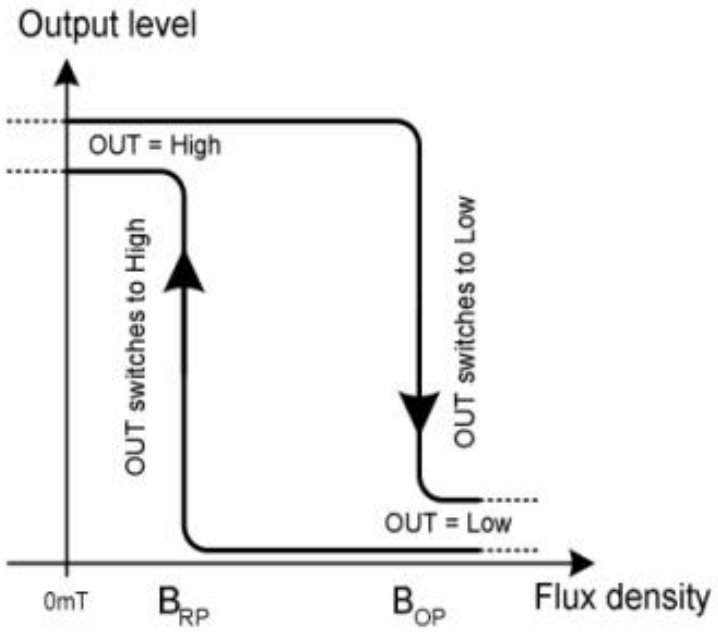


8. Function Description

The ES44EUA exhibits unipolar magnetic switching characteristics. Therefore, it requires south or north poles to operate properly.

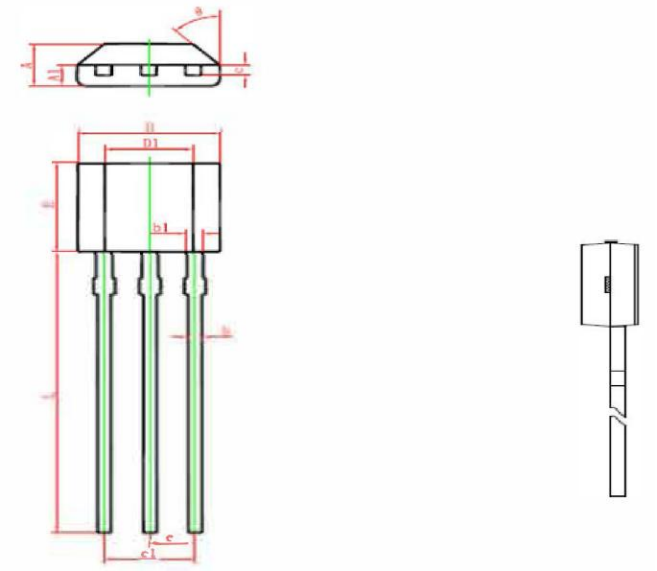
The device behaves as a unipolar with asymmetric operating and release switching points. This means While the magnetic flux density(B) is larger than operate point (Bop), the output will be turned on (Low), while the magnetic flux density(B) is lower than release point (Brp), then turn off (High).

9. Magnetic Activation



Unipolar switch characteristic

10. Dimension (TO-92S)



Dimension; mm

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.420	1.620	0.056	0.064
A1	0.660	0.860	0.026	0.034
b	0.350	0.480	0.014	0.019
b1	0.400	0.550	0.016	0.022
c	0.360	0.510	0.014	0.020
D	3.900	4.100	0.154	0.161
D1	2.280	2.680	0.090	0.106
E	3.050	3.250	0.120	0.128
e	1.270 TYP.		0.050 TYP.	
e1	2.440	2.640	0.096	0.104
L	15.100	15.500	0.594	0.610
θ	45° TYP.		45° TYP	

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