

### 3.3-26V $V_{DD}$ Hall Effect Sensor

#### 1. Description

The ESU18EUA is small, versatile digital Hall-effect devices that are operated by the magnetic field from a permanent magnet or an electromagnet designed to respond to alternating North and South poles

These latching sensor ICs have enhanced sensitivity, which often allows for the use of less expensive, The ESU18EUA in the leaded, flat TO-92S package.

Its 3V capability allows for use in low voltage applications, promoting energy efficiency.

#### 2. Features

- Wide operating voltage range: 3.3V to 26V
- Built-in reverse voltage protecting capability
- RoHS-compliant material meets directive 2011/65/EU
- BCD process technology
- Package: TO-92S package
- Enhanced sensitivity: will operate from 35 Gauss typical, at 25°C

#### 3. Applications

- Speed and RPM sensing
- Electric window lift
- Flow-rate sensing
- Brushless dc motor
- Robotics control
- Medication bin monitor on portable drug carts

#### 4. Package Information

Part Number	Marking	Description
ESU18EUA	U18	Flat, TO-92S package, bulk packing (1000 units per bag)

Table-1 Package Information

## 5. Pin Configuration and Functions

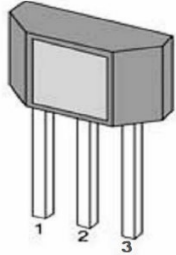
Name	Number	Description	Outline
V <sub>DD</sub>	1	Supply Voltage Pin	
GND	2	Ground terminal	
OUT	3	Collector Output pin	

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 <sub>DD</sub>	-	28	V
VDD Reverse Voltage VDD	V <sub>RDD</sub>	-	-28	V
Supply Current	I <sub>DD</sub>	-	20	mA
Output Voltage	V <sub>OUT</sub>	-0.3	28	V
Output Current	I <sub>OUT</sub>	-	25	mA
Operating Ambient Temperature	T <sub>A</sub>	-40	125	°C
Storage Temperature	T <sub>S</sub>	-50	150	°C
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

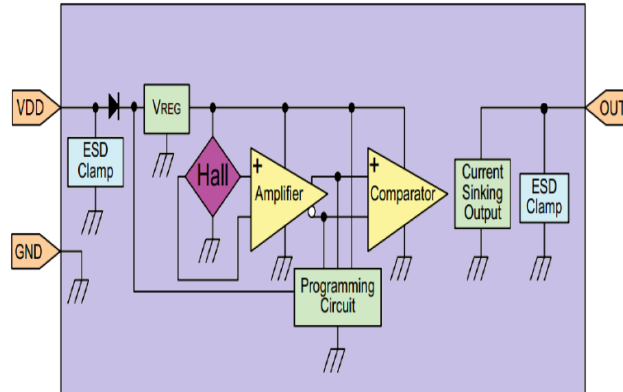
## 6.3 Electric Characteristics

(At 3.3V to 26V supply, 20mA load, TA= -40°C to 125°C)

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
V <sub>DD</sub>	Supply voltage	-40°C to 125°C	3.3		26	V
I <sub>DD</sub>	Supply Current	V <sub>DD</sub> = 12V		3.0	8.0	mA
V <sub>DSon</sub>	Output saturation voltage	at 20mA, Gauss >120			0.4	V
I <sub>OFF</sub>	Output Leakage Current	B<120GS			10	uA
T <sub>R</sub>	Output rise time	V <sub>DD</sub> =12V at 25°C C <sub>L</sub> = 20 pF			1.5	us
T <sub>F</sub>	Output fall time	V <sub>DD</sub> =12V at 25°C C <sub>L</sub> = 20 pF			1.5	us
B <sub>OP</sub>	Magnetic operating point	-40°C to 125°C	5.0	35	65	Gauss
B <sub>RP</sub>	Magnetic release point	-40°C to 125°C	-65	-35	-5	Gauss
B <sub>HYST</sub>	Magnetic hysteresis window	TA=25°C  Bop-BRP		70		Gauss
T	Operating temperature		-40		125	°C
T <sub>s</sub>	Storage temperature:		-50		150	°C

Table-5 Electric Characteristics

## 7. Typical Application



## 8. Function Description

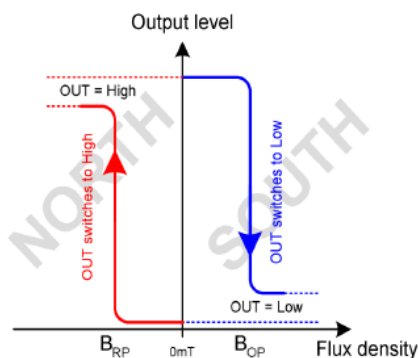
The ESU18EUA exhibits latch magnetic switching characteristics. Therefore, it requires both south and north poles to operate properly.

The device behaves as a latch with symmetric operating and release switching points ( $B_{OP} = |B_{RP}|$ ). This means magnetic fields with equivalent strength and opposite direction drive the output high and low.

Removing the magnetic field ( $B \rightarrow 0$ ) keeps the output in its previous state. This latching property defines the device as a magnetic memory.

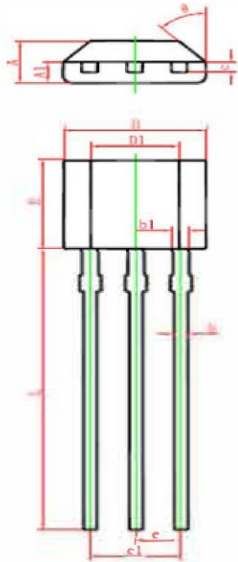
A magnetic hysteresis  $B_{hyst}$  keeps  $B_{op}$  and  $B_{rp}$  separated by a minimal value. This hysteresis prevents output oscillation near the switching point.

## 9. Magnetic Activation



TO-92S

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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