

### Features and Benefits

- **1.40mm Hall Elements Spacing**
- **Magnetic Type: Bipolar Switch**
- **Operating Voltage Range:**  
Supply Voltage 3.0~24V
- **Specified Operating Temperature Range:**  
From -40°C~150°C
- **High Magnetic Sensitivity**  
 $B_{OP}=120\text{Gauss}$ ,  $B_{RP}=-120\text{Gauss}$ (typical)
- **Lead Free Package**  
Flat TO-94, SOT-89B
- **High ESD Rating**
- **RoHS Compliant**  
2011/65/EU

### Applications

- **Magnetic encoder**
- **Speed detection**
- **Direction detection**

## Family Members

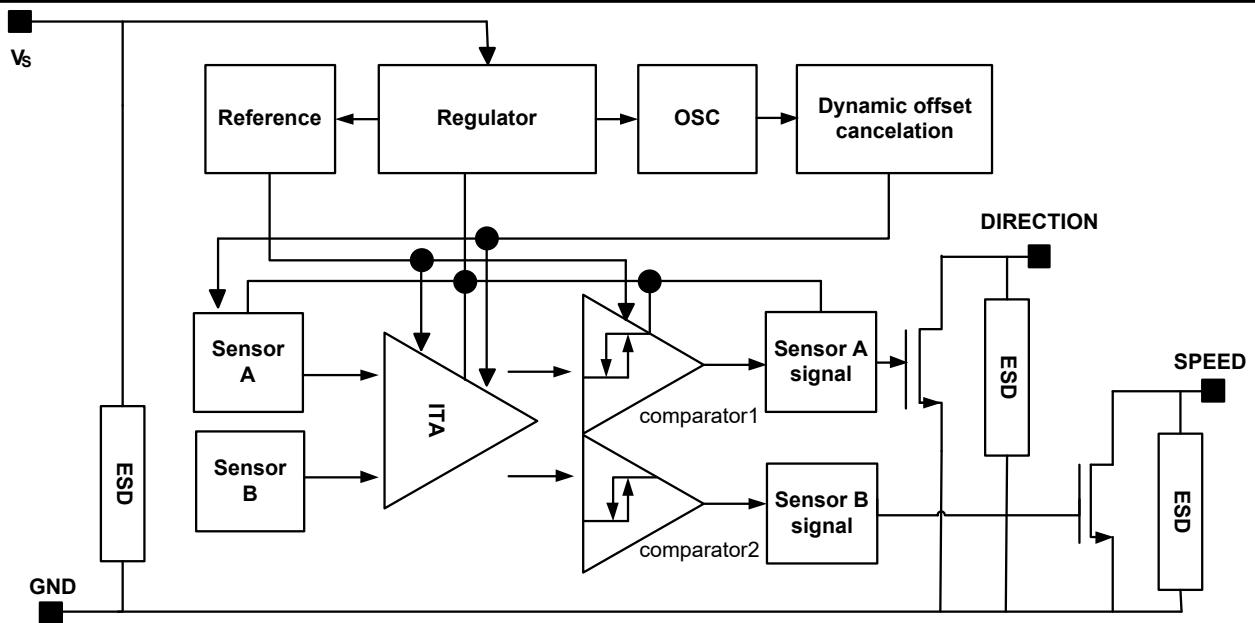
Part number	Description
MT1452A	Flat TO-94 package, bulk packaging (1000pcs/bag)
MT1452BT	SOT-89B package, tape and reel packaging (1000pcs/bag)

## General Description

The MT1452 is a dual channel switch hall sensor with two hall sensing elements, it output two digital signal for speed and direction processing.

The MT1452 internally includes two hall sensing elements located 1.40mm apart, an on-chip hall voltage generator, voltage regulator for operation with supply voltage 3.0 to 24V, temperature compensation circuitry, small-signal amplifier, Hall sensor with dynamic offset cancellation system, Schmitt trigger and open-drain output. It is easy processing of speed and direction signals.

The MT1452 family provides a variety of packages to customers: flat TO-94 for through-hole mount and SOT-89B for surface mount. All packages are RoHS compliant.



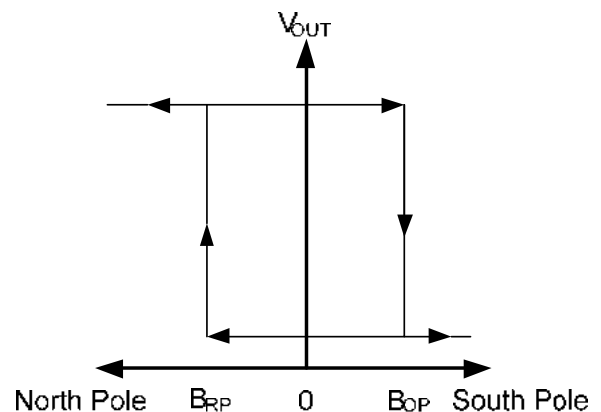
**Functional Block Diagram**

### Definition of Magnetic Parameters

$B_{OP}$ : Operating point, magnetic flux density applied on the branded side of the package which turns the output driver ON ( $V_{OUT}=Low$ )

$B_{RP}$ : Release point, magnetic flux density applied on the branded side of the package which turns the output driver OFF ( $V_{OUT}=High$ )

$B_{HYST}$ : Hysteresis window,  $|B_{OP}-B_{RP}|$



### Pin Description

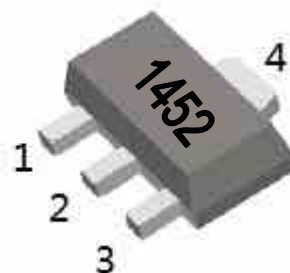
MT1452A

Name	Number	Description
$V_S$	1	Power Supply
DIRECTION	2	Direction Signal Out
SPEED	3	Speed Signal Out
GND	4	Ground



MT1452BT

Name	Number	Description
$V_S$	1	Power Supply
DIRECTION	2	Direction Signal Out
SPEED	3	Speed Signal Out
GND	4	Ground



### Electrical and Magnetic Characteristics

#### Absolute Maximum Ratings

Absolute maximum ratings are limiting values to be applied individually, and beyond which the serviceability of the circuit may be impaired. Functional operability is not necessarily implied. Exposure to absolute maximum rating conditions for an extended period of time may affect device reliability.

Absolute maximum ratings: all voltages listed are referenced to GND.

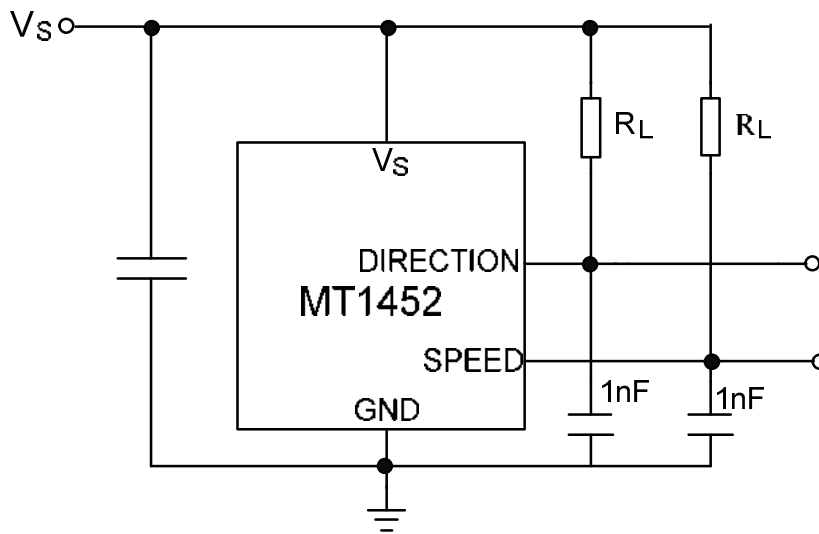
Symbol	Parameters	Min	Max	Units
V <sub>S</sub>	Supply Voltage	-	30	V
V <sub>RCC</sub>	Reverse Battery Voltage	-	-0.5	V
V <sub>OUT</sub>	Output Voltage	-	30	V
I <sub>OUT</sub>	Continuous output current	-	25	mA
T <sub>A</sub>	Operating Ambient Temperature	-40	150	°C
T <sub>S</sub>	Storage temperature	-50	150	°C
T <sub>J</sub>	Junction temperature	-	150	°C
B	Magnetic flux	No Limit		Gauss

### MT1452 Series Specifications

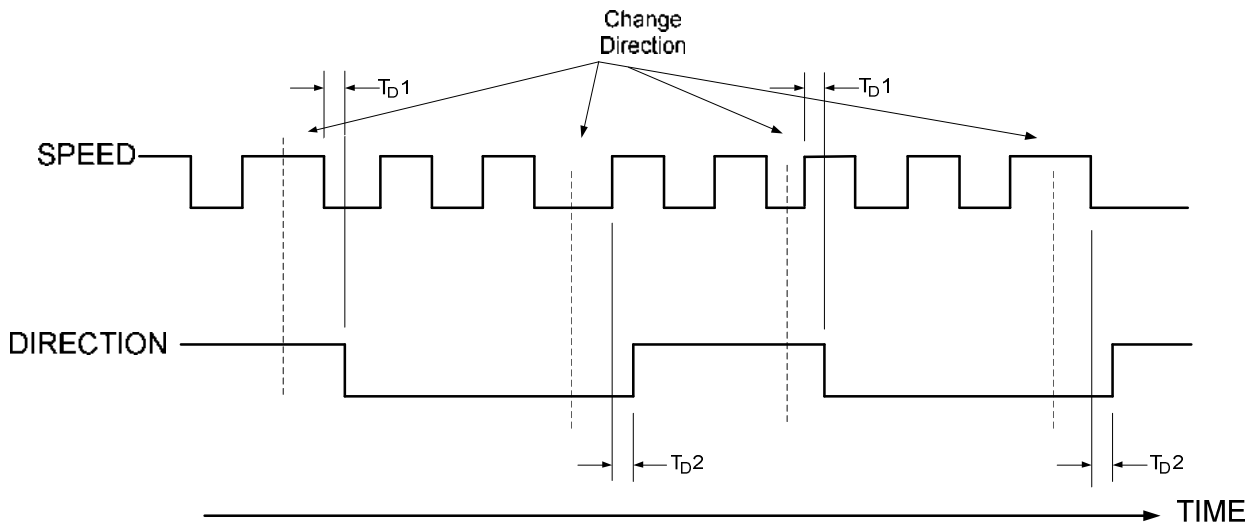
At T<sub>A</sub> = -40°C to 150°C, V<sub>S</sub> = 3.0V to 24V (unless otherwise specified)

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
V <sub>S</sub>	Supply Voltage	Operating	3.0	5	24	V
I <sub>S</sub>	Supply Current	B < B <sub>RP</sub>	-	2.5	4	mA
V <sub>SON</sub>	Output Saturation Voltage	I <sub>OUT</sub> = 20mA, B > B <sub>OP</sub>	-	-	0.4	V
I <sub>OFF</sub>	Output Leakage Current	B < B <sub>RP</sub> , V <sub>OUT</sub> = 24V	-	0.1	1.0	µA
T <sub>R</sub>	Output Rise Time	R <sub>L</sub> = 10kohm, C <sub>L</sub> = 20pF	-	-	1.0	µs
T <sub>F</sub>	Output Fall Time	R <sub>L</sub> = 10kohm, C <sub>L</sub> = 20pF	-	-	1.0	µs
T <sub>D1</sub>	Delay Time 1		-	2.5	-	µs
T <sub>D2</sub>	Delay Time 2		-	1.5	-	µs
B <sub>OP</sub>	Magnetic Operating Point	At T <sub>A</sub> = 25°C	90	120	150	Gauss
B <sub>RP</sub>	Magnetic Release Point	At T <sub>A</sub> = 25°C	-150	-120	-90	Gauss
B <sub>HYST</sub>	Hysteresis Window	At T <sub>A</sub> = 25°C,  B <sub>OP</sub> - B <sub>RP</sub>	200	240	280	Gauss
D <sub>IS</sub>	Distance of Hall elements		1.39	1.40	1.41	mm

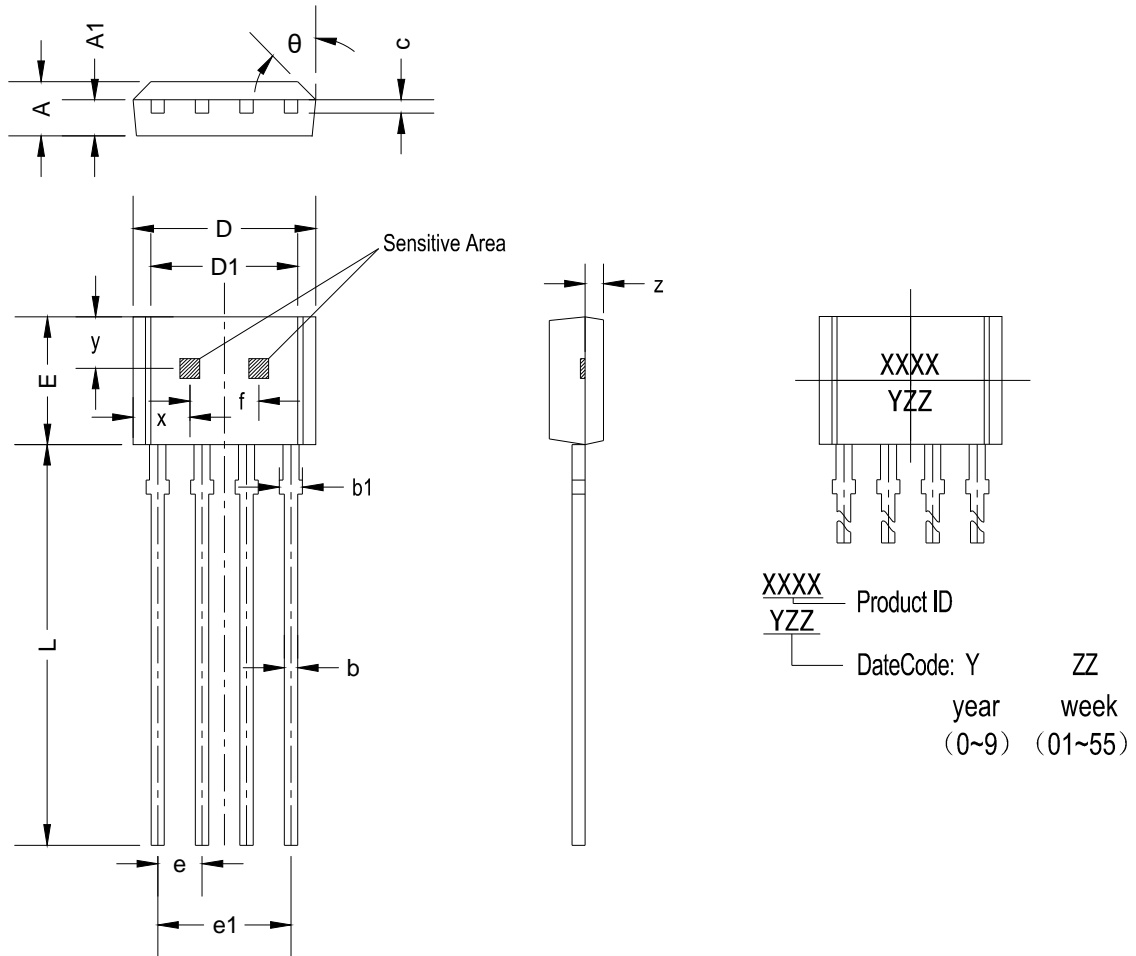
### Typical Application Circuit Note: $R_L$ recommend 1Kohm to 10Kohm



### Typical Output Waveform

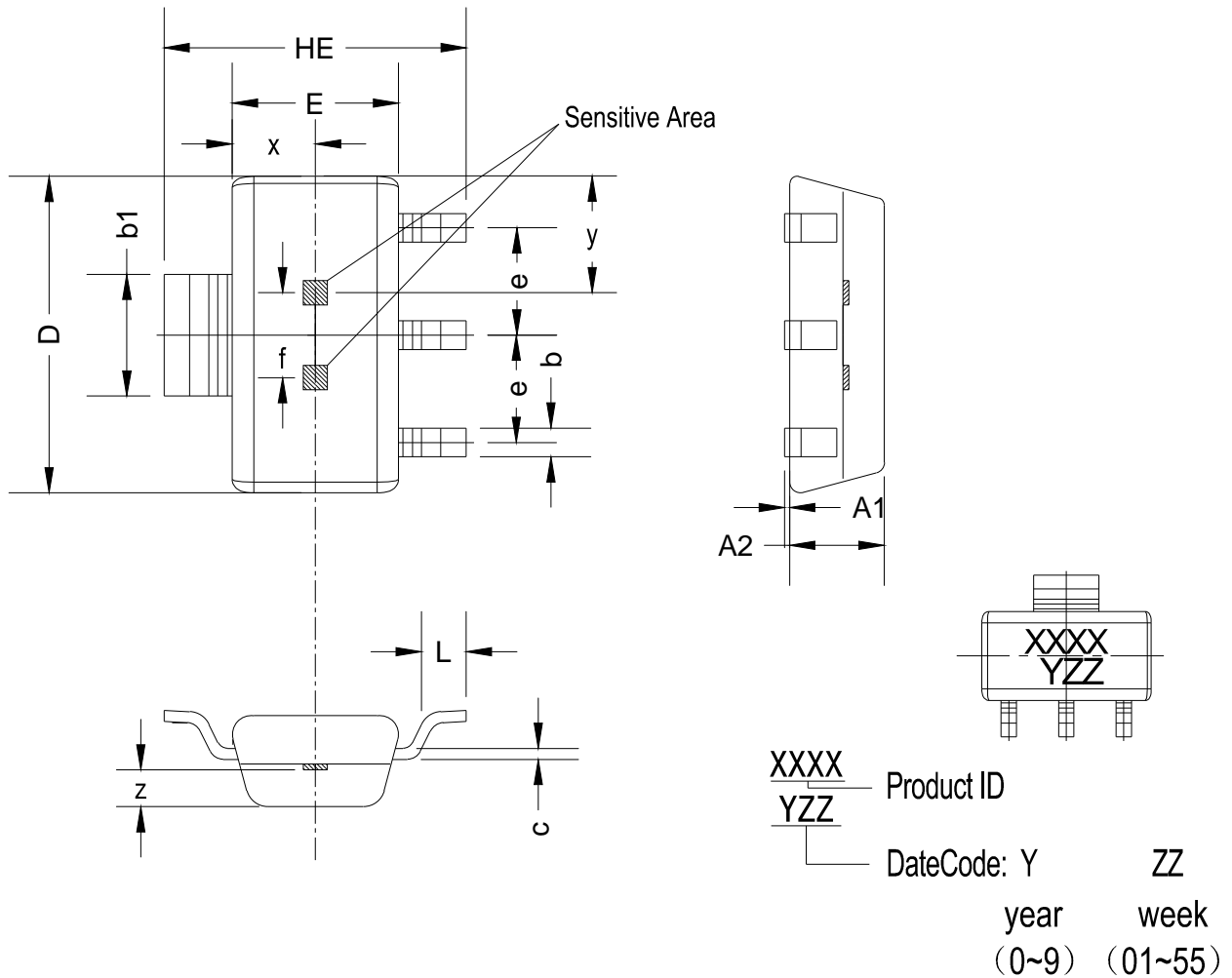


### PACKAGE DESIGNATOR (MT1452A) Flat TO-94



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.420	1.660	0.056	0.065
A1	0.660	0.860	0.026	0.034
b	0.350	0.480	0.014	0.019
b1	0.400	0.650	0.016	0.026
c	0.360	0.510	0.014	0.020
D	5.100	5.300	0.201	0.208
D1	4.100	4.300	0.161	0.169
E	3.550	3.750	0.140	0.147
e	1.267	1.273	0.050	0.050
e1	3.780	3.840	0.149	0.151
L	13.500	15.500	0.531	0.610
f	1.390	1.410	0.055	0.056
x	1.800	2.000	0.071	0.079
y	1.175	1.375	0.046	0.054
z	0.500TYP		0.020TYP	
$\theta$	10°	12°	10°	12°

### PACKAGE DESIGNATOR (MT1452BT) SOT-89B



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A1	0.000	0.100	0.000	0.004
A2	1.220	1.420	0.048	0.056
b	0.300	0.500	0.012	0.020
b1	1.600	1.800	0.063	0.070
D	4.400	4.600	0.173	0.181
c	1.152REF		0.045REF	
E	2.400	2.600	0.094	0.102
HE	4.000	4.400	0.157	0.173
e	1.500TYP		0.060TYP	
L	0.350	0.550	0.014	0.022
x	0.800	1.000	0.031	0.039
y	1.450	1.650	0.057	0.065
f	1.390	1.410	0.055	0.056
z	0.400TYP		0.016TYP	