

### Features and Benefits

- **Bipolar Technology**
- **Magnetic Type: Uni-polar**
- **Wide Operating Voltage Range:**  
Supply Voltage 3.8~30V
- **Specified Operating Temperature Range:**  
From -40°C~150°C
- **Magnetic Sensitivity**  
Bop=80Gauss, Brp=50Gauss (typical)
- **Lead Free Package**  
Flat TO-92, SOT-23, SOT-89B
- **Open Collector Output**
- **RoHS Compliant**  
2011/65/EU

### Applications

- BLDC Motor Communication for E-Bike
- Position Detection
- Proximity Switch

### Family Members

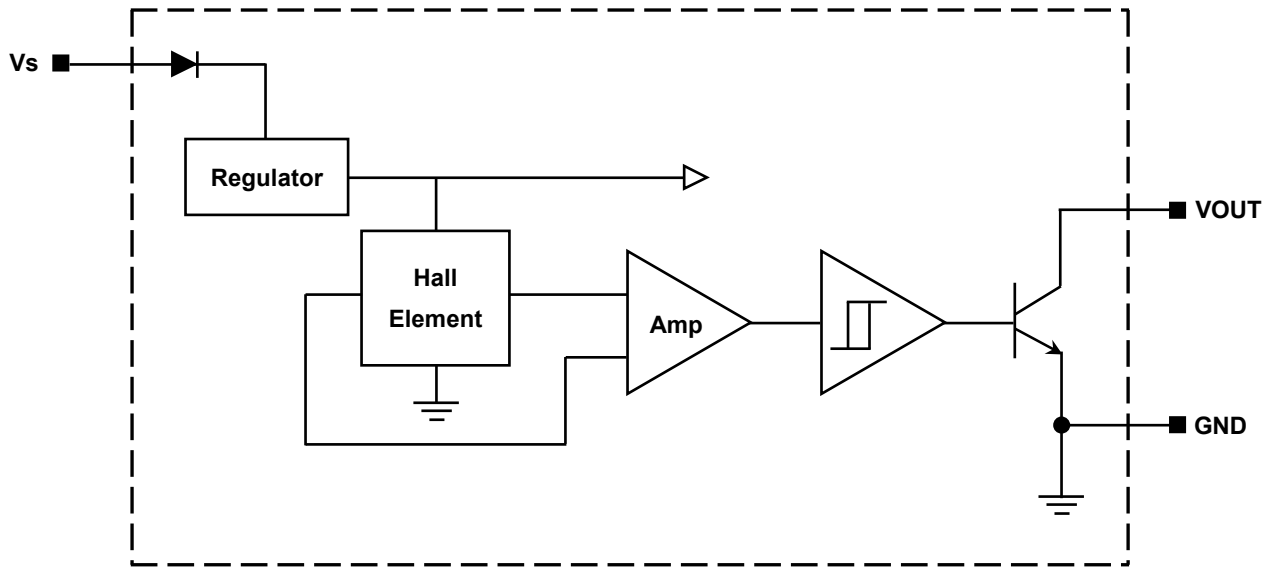
Part number	Description
MT4102A	Flat TO-92 package, bulk packaging (1000pcs/bag)
MT4102A-T	Flat TO-92 package, Radial lead, bulk packaging (1000pcs/bag)
MT4102AT	SOT-23 package, tape and reel packaging (3000pcs/bag)
MT4102BT	SOT-89B package, tape and reel packaging (1000pcs/bag)
MT4102ET	SOT-23(thin outline) package, tape and reel packaging (3000pcs/bag)

### General Description

The MT4102 family, produced with Bipolar technology, The Hall IC internally includes an on-chip Hall voltage generator, a voltage regulator for operation with supply voltages of 3.8 to 30V, reverse protection diode, temperature compensation circuitry, small-signal amplifier, Schmitt trigger and an open-collector output.

They are designed to respond to a single pole: North (AT) or South (A, BT and ET). 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).

The MT4102 family provides a variety of packages to customers: SOT-23/SOT-89B for surface mount and TO-92 flat for through-hole mount. All packages are RoHS compliant.



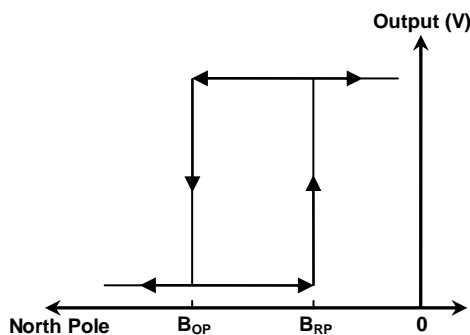
Functional Block Diagram

### Function Description

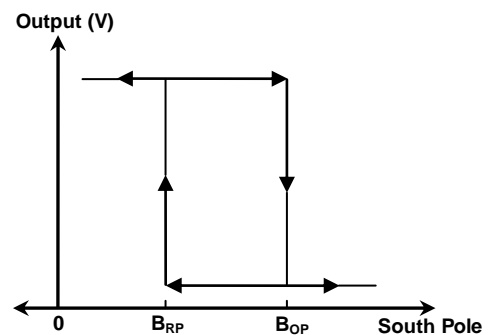
#### Definition of Magnetic Parameters

- BOP: Operating Point  
Magnetic flux density applied on the branded side of the package which turns the output driver ON ( $V_{OUT} = \text{Low}$ )
- BRP: Release Point  
Magnetic flux density applied on the branded side of the package which turns the output driver OFF ( $V_{OUT} = \text{high}$ )
- BHYST: Hysteresis Window  
BOP-BRP

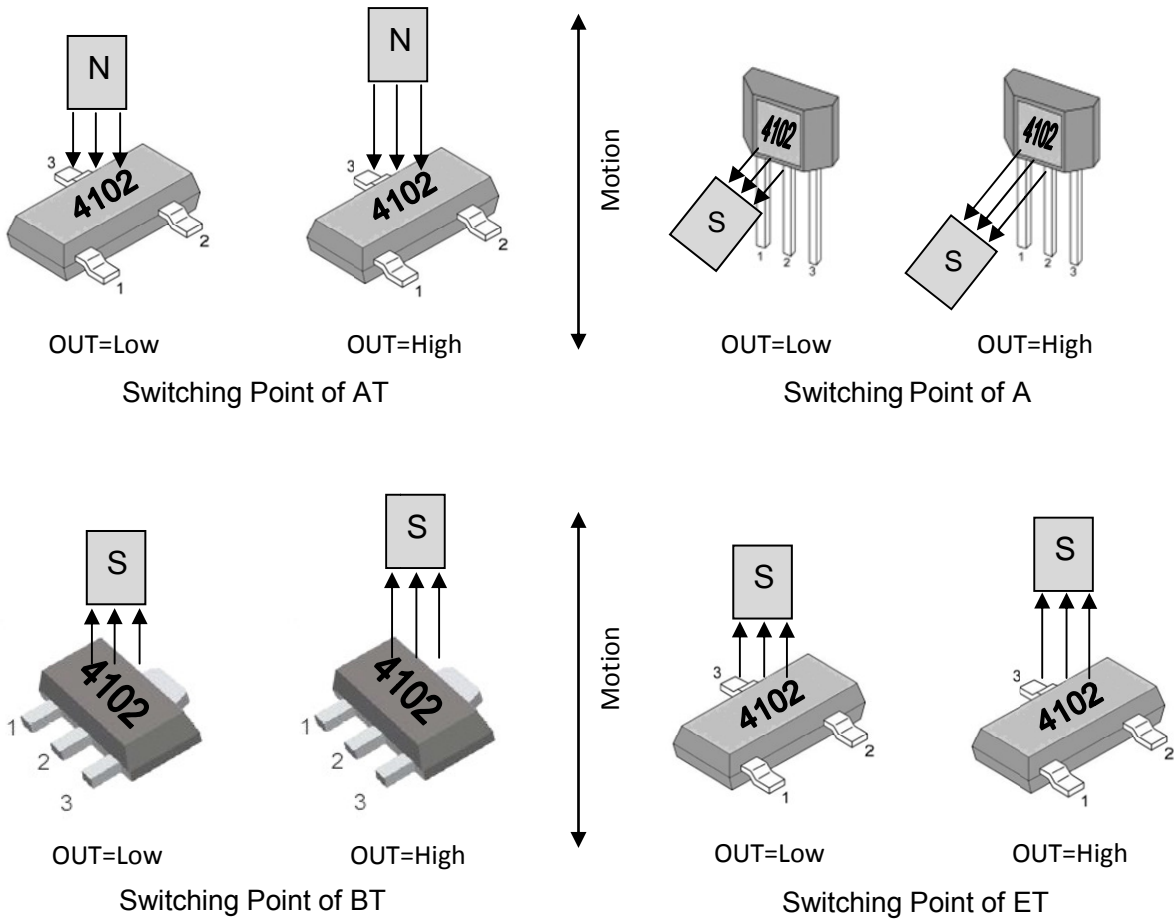
#### Definition of Switching Function



Switching Behavior of AT



Switching Behavior of A, BT and ET



Note: Direction of magnetic flux

### Pin Description

#### MT4102AT

Name	Number	Description
Vs	1	Power
GND	3	Ground
Output	2	Open-Collector output

#### MT4102A (MT4102A-T)

Name	Number	Description
Vs	1	Power
GND	2	Ground
Output	3	Open-Collector output

#### MT4102ET

Name	Number	Description
Vs	1	Power
GND	3	Ground
Output	2	Open-Collector output

#### MT4102BT

Name	Number	Description
Vs	1	Power
GND	2	Ground
Output	3	Open-Collector output

### 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.

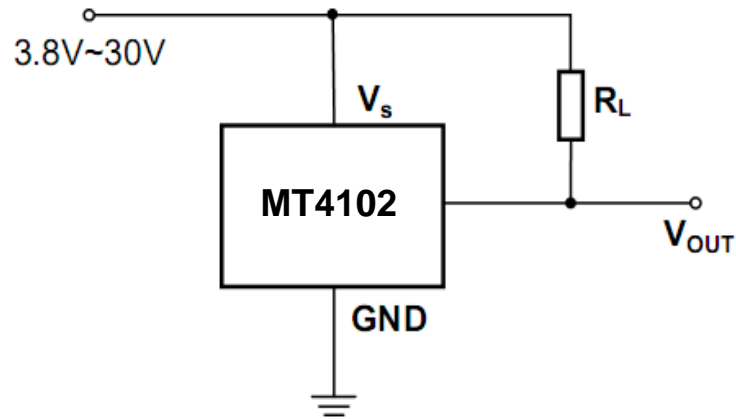
Symbol	Parameters	Min	Max	Units
V <sub>S</sub>	Supply Voltage	-	40	V
V <sub>RCC</sub>	Reverse Battery Voltage	-	-40	V
V <sub>OUT</sub>	Output Voltage	-	40	V
I <sub>OUT</sub>	Continuous output current	-	50	mA
T <sub>A</sub>	Operating Ambient Temperature	-40	150	°C
T <sub>S</sub>	Storage temperature	-50	150	°C
T <sub>J</sub>	Junction temperature	-	165	°C
B	Magnetic flux	No Limit		Gauss

#### MT4102 Series Specifications

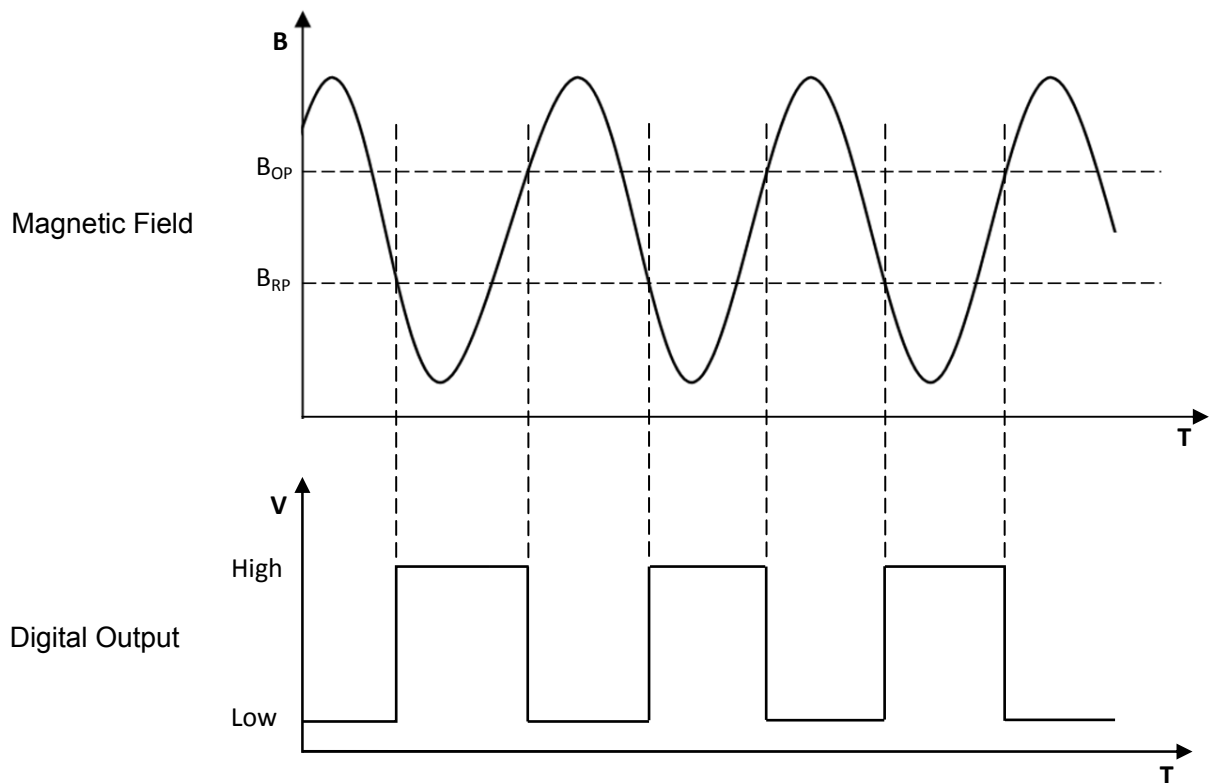
at T<sub>A</sub> = -40°C to 150°C, V<sub>S</sub> = 3.8V to 30V (unless otherwise specified)

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
V <sub>S</sub>	Supply Voltage	Operating	3.8	-	30	V
I <sub>S</sub>	Supply Current	B < B <sub>RP</sub>	-	4	10	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> =30V	-	-	10	uA
T <sub>R</sub>	Output Rise Time	R <sub>L</sub> =1KOhm, C <sub>L</sub> =20pF	-	-	1.5	uS
T <sub>F</sub>	Output Fall Time	R <sub>L</sub> =1KOhm, C <sub>L</sub> =20pF	-	-	1.5	uS
F <sub>SW</sub>	Maximum Switching Frequency		-	-	100	KHz
R <sub>TH</sub>	SOT-23 Package Thermal Resistance		-	301	-	°C/W
	TO-92 Package Thermal Resistance		-	230	-	°C/W
	SOT-89B Package Thermal Resistance		-	230	-	°C/W
B <sub>OP</sub>	Magnetic Operating Point		60	80	100	Gauss
B <sub>RP</sub>	Magnetic Release Point		30	50	70	Gauss
B <sub>HYST</sub>	Hysteresis Window	B <sub>OP</sub> -B <sub>RP</sub>	10	30	50	Gauss

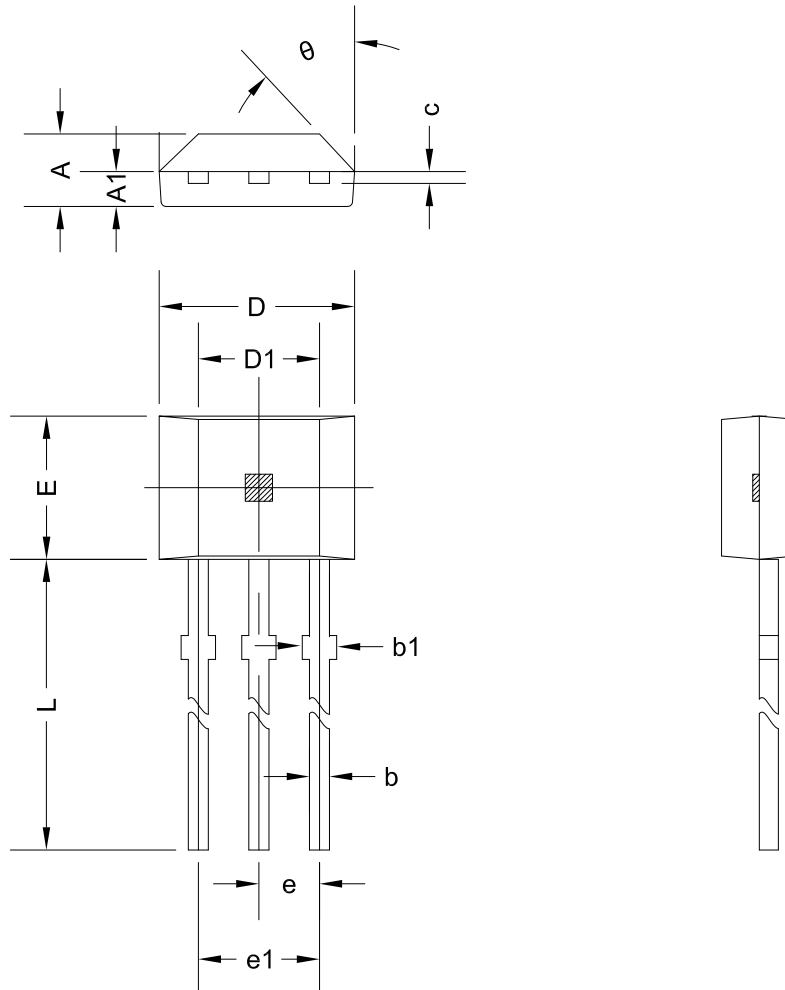
### Typical Application Circuit Note: $R_L$ recommend 1Kohm to 10Kohm



### Typical Output Waveform (The TO-92 package as an example )

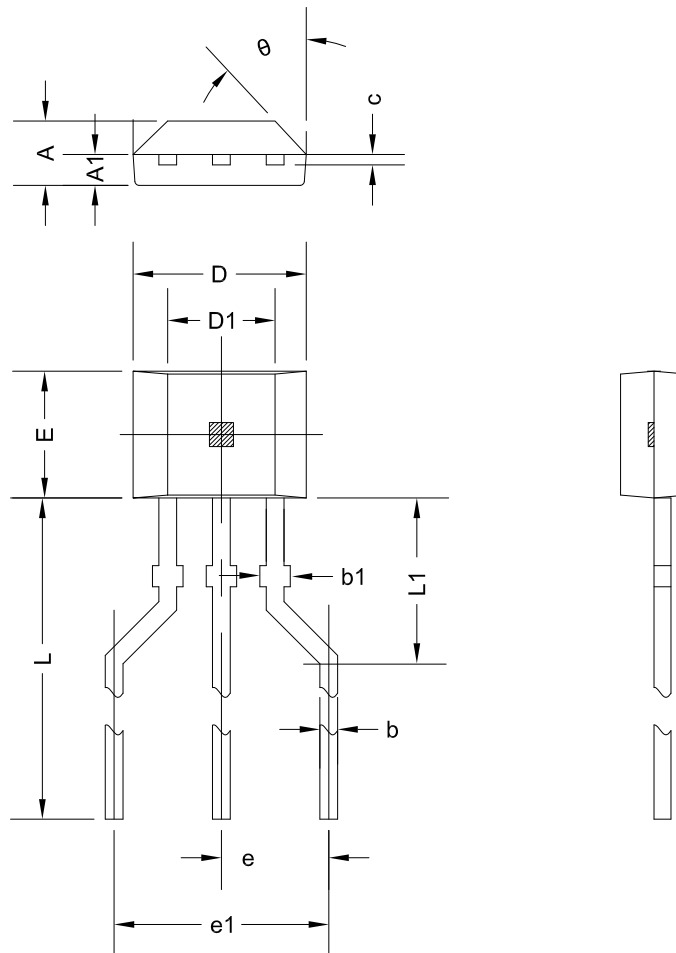


## PACKAGE DESIGNATOR (MT4102A) TO-92 Flat



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	4.200	0.154	0.165
D1	2.970	3.270	0.117	0.129
E	2.870	3.124	0.113	0.123
e	1.270 TYP.		0.050 TYP.	
e1	2.440	2.640	0.096	0.104
L	13.600	15.500	0.535	0.610
θ	45° TYP.		45° TYP.	

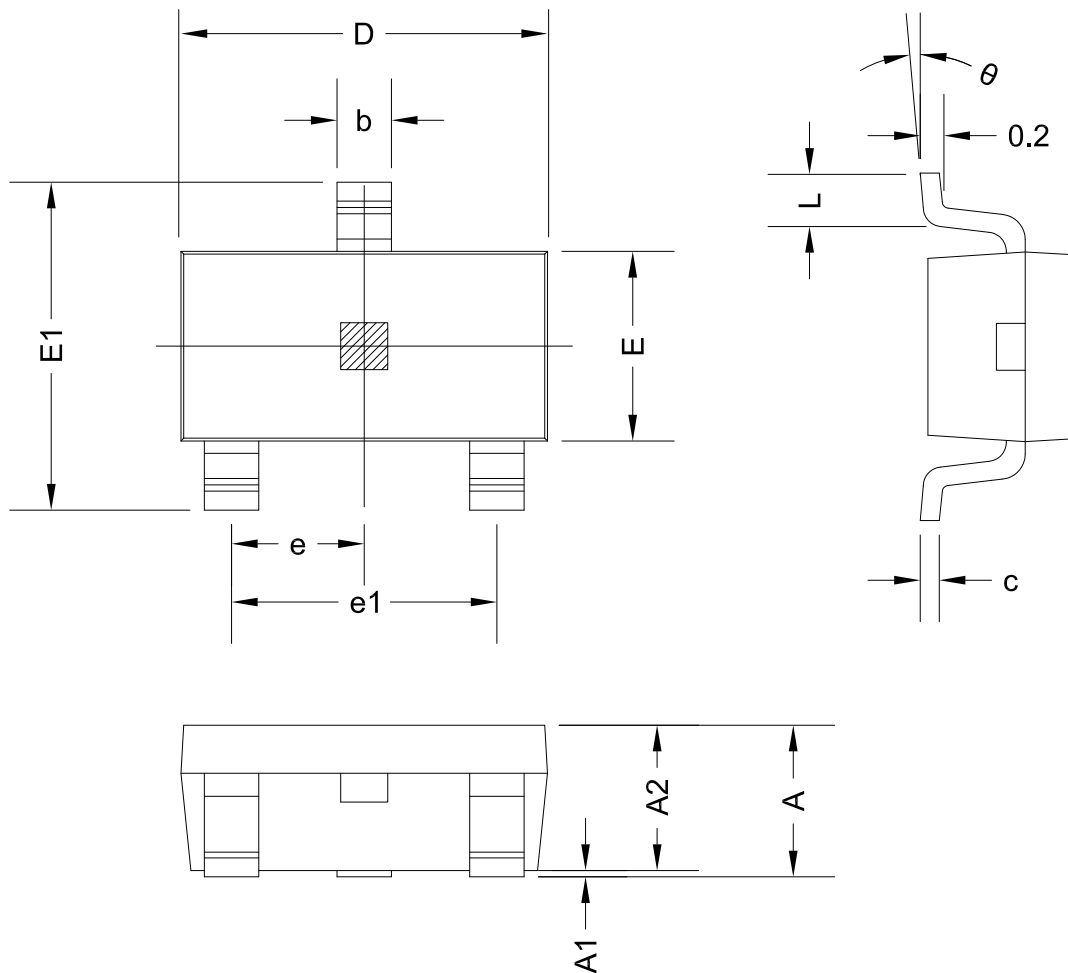
**PACKAGE DESIGNATOR**  
(MT4102A-T) Flat TO-92 Radial lead



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	4.200	0.154	0.165
D1	2.970	3.270	0.117	0.129
E	2.870	3.124	0.113	0.123
e	2.540 TYP.		0.100 TYP.	
e1	5.080 TYP.		0.200 TYP.	
L	14.300 REF.		0.563 REF.	
L1	2.630 REF.		0.104 REF.	
θ	45° TYP.		45° TYP.	

## PACKAGE DESIGNATOR

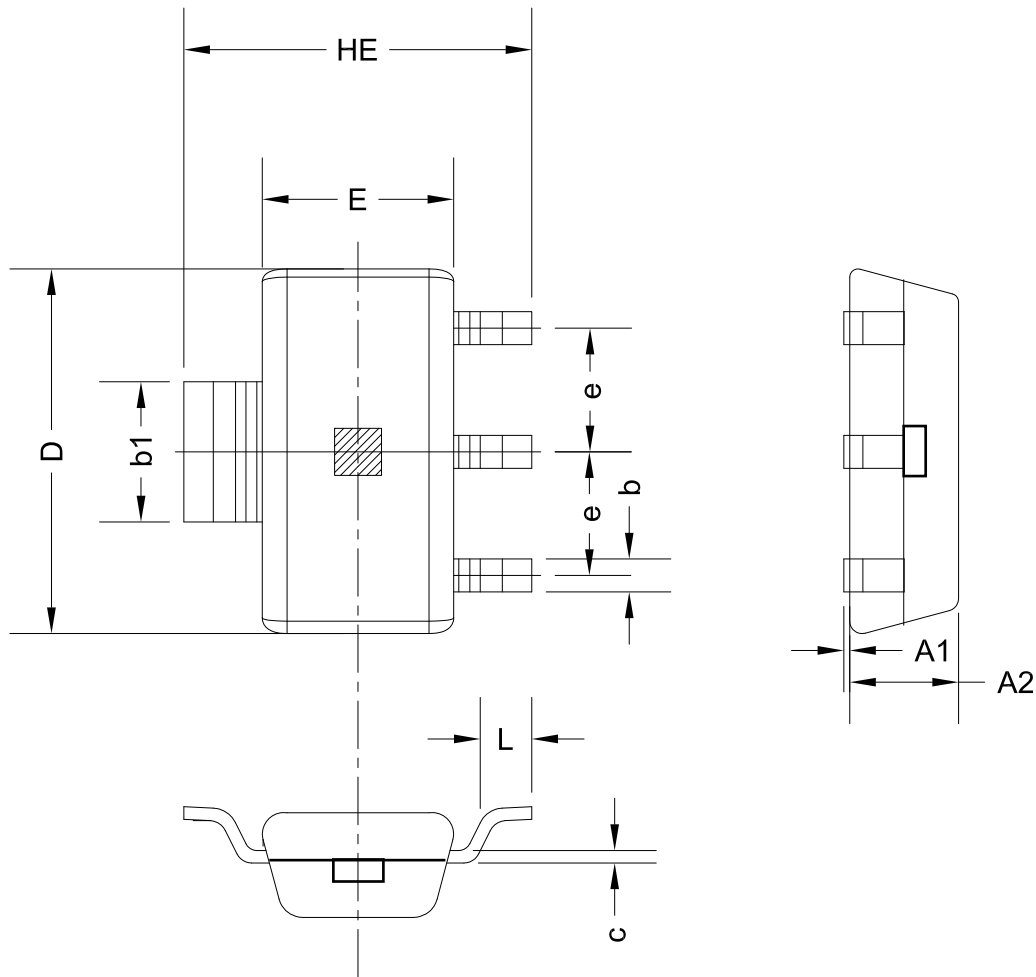
(MT4102AT) SOT-23-3L



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

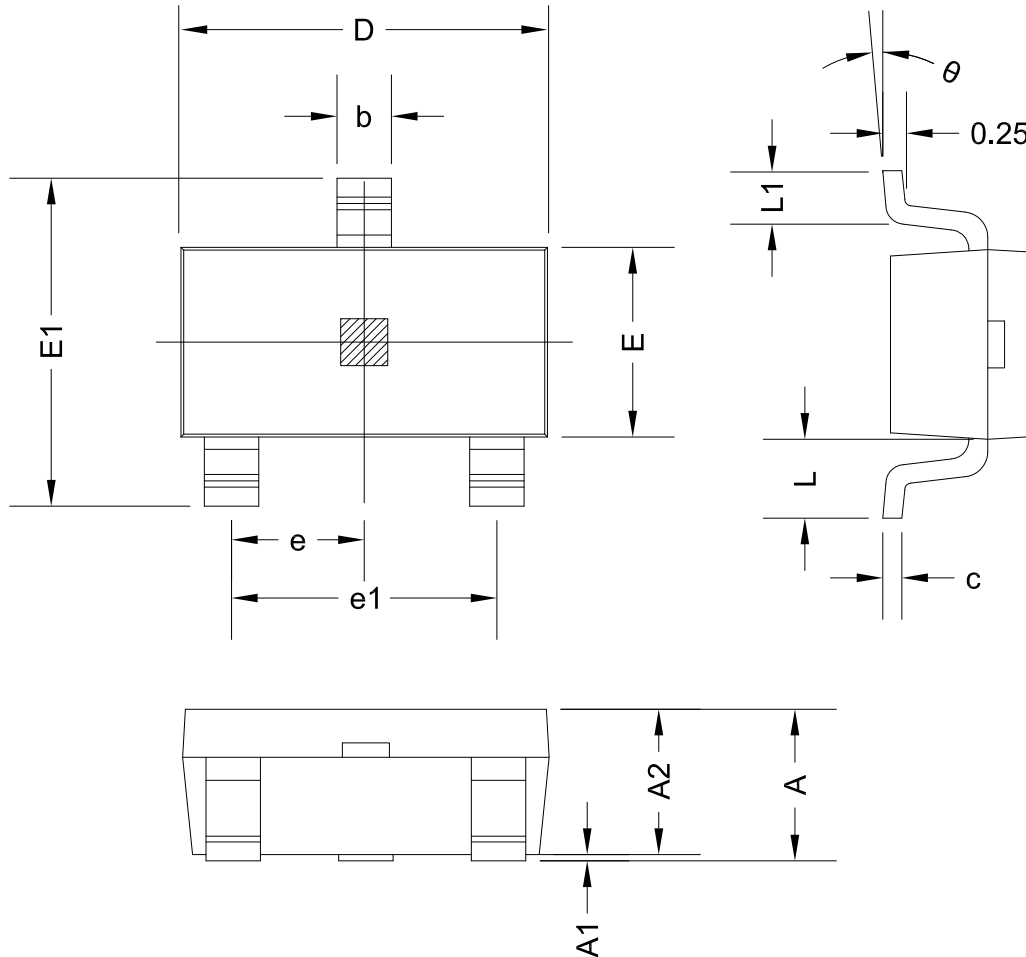


## PACKAGE DESIGNATOR (MT4102BT) SOT-89B



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	1.152 REF.		0.045 REF.	
E	2.400	2.600	0.094	0.102
HE	4.000	4.400	0.157	0.173
e	1.500 TYP.		0.060 TYP.	
L	0.350	0.550	0.014	0.022

**PACKAGE DESIGNATOR**  
(MT4102ET) SOT-23



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°