

High Temperature Bipolar Hall Effect Position Sensor

General Description

The KH1204 is an integrated Hall effect latched sensor designed for electronic commutation of brush-less DC motor applications. The Device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt to provide switching hysteresis for noise rejection, and open-collector output. An internal band-gap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

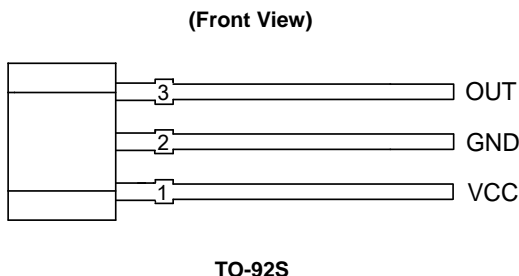
The KH1204 is designed to respond to alternating North and South poles. While the magnetic flux density is larger than operate point(B_{OP}), the output will be turned on(Low), the output is held until the magnetic flux density is lower than release point(B_{RP}), then turn off(High).

The KH1204 is available in TO-92S, SOT23-3 and SOT89-3 packages which are optimized for most applications.

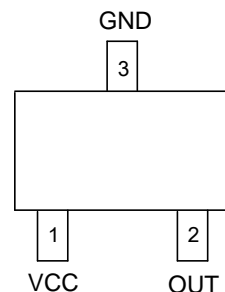
Features

- Bipolar Hall Effect Sensor
- 3.8V to 30V Wide Operating Voltage
- Open Collector Output Structure
- Integrated Power Reverse connection Protection
- Superior Temperature Stability: -40~+150 °C
- 50mA Output Sink Current
- TO-92S(SIP-3L), SOT23-3 and SOT89-3 package

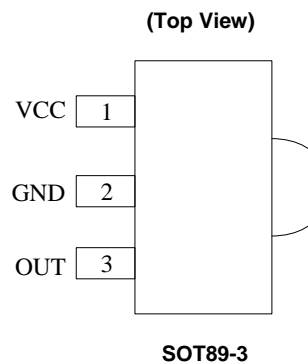
Pin Assignments



(Top View)



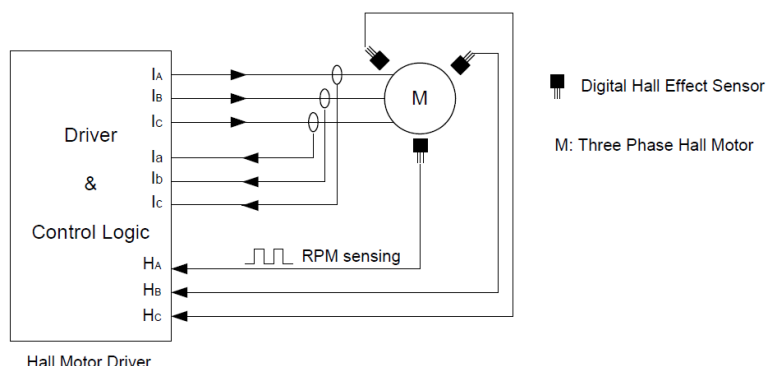
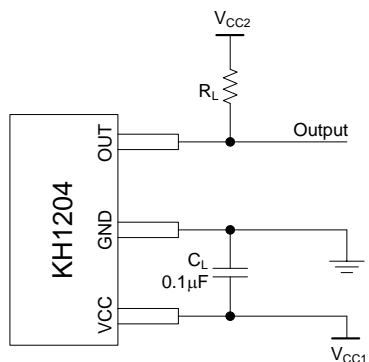
(Top View)



Applications

- Rotor Position Sensing
- Current Switch
- Encoder
- RPM Detection
- Brush-less DC Motor/Fan
- Revolution Counting
- Proximity Detection
- Speed measurement

Typical Applications Circuit

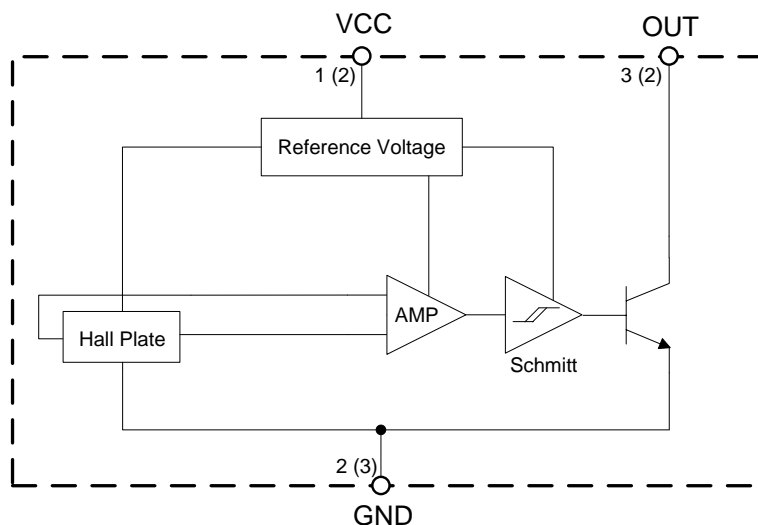


High Temperature Bipolar Hall Effect Position Sensor

Pin Descriptions

Pin Number			Pin Name	Function
TO-92S	SOT23-3	SOT89-3		
1	1	1	VCC	Supply voltage
2	3	2	GND	Ground pin
3	2	3	OUT	Output Pin

Functional Block Diagram



A(B)

A for TO-92S and SOT89-3

B for SOT23-3

Absolute Maximum Rates (@TA=+25°C, Note 1&2)

Symbol	Parameter		Rating	Unit
V _{CC}	Supply Voltage		-30 to 40	V
I _{CC}	Supply Current (Fault)		20	mA
V _{OUT}	Output Voltage(OFF Condition Only)		40	V
I _{OUT}	Output ON Current		50	mA
B	Magnetic Flux Density		Unlimited	Gauss
R _{TH}	Power Dissipation	TO-92S	230	°C/W
		SOT23-3	301	
		SOT89-3	230	
T _{STG}	Storage Temperature		-65 to +150	°C
T _J	Junction Temperature		+150	°C

Notes: 1. Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.
 2. Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

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Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	3.8	30	V
T_{OP}	Operating Temperature	-40	+150	°C

Electrical Characteristics (@ $T_A=+25^{\circ}\text{C}$, $V_{CC}=12\text{V}$, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	Operating	3.8	12	30	V
I_{CC}	Supply current	$V_{DD}=3.5$ to 24V , Output Off	–	4.5	10	mA
I_{LE}	Output Leakage current	Released	–	–	10	uA
V_{SAT}	Saturation Voltage	$I_{OUT}=25\text{mA}$	–	150	250	mV
		$I_{OUT}=50\text{mA}$	–	400	500	mV
T_R	Rise Time	$R_L=820\Omega$, $C_L=20\text{pF}$	–	0.2	–	μs
T_F	Fall Time	$R_L=820\Omega$, $C_L=20\text{pF}$	–	0.5	–	μs
F_{SW}	Maximum Switching Frequency	–	–	–	100	kHz

Magnetic Characteristics (@ $T_A=+25^{\circ}\text{C}$, $V_{CC}=12\text{V}$, unless otherwise specified. Note 3)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
B_{OP}	Operating Point	$B > B_{OP}$, $V_{OUT}=\text{low}(\text{output on})$	–	40	120	Gauss
B_{RP}	Releasing Point	$B < B_{RP}$, $V_{OUT}=\text{high}(\text{output off})$	-120	-40	–	Gauss
B_{HYS}	Hysteresis	$ B_{OP} - B_{RP} $ (Note 4)	40	80	–	Gauss

Notes: 3. The specifications stated here are guaranteed by design. 1 Gauss=0.1mT
 4. B_{OP} =operating point (output turns on); B_{RP} =releasing point (output turns off)

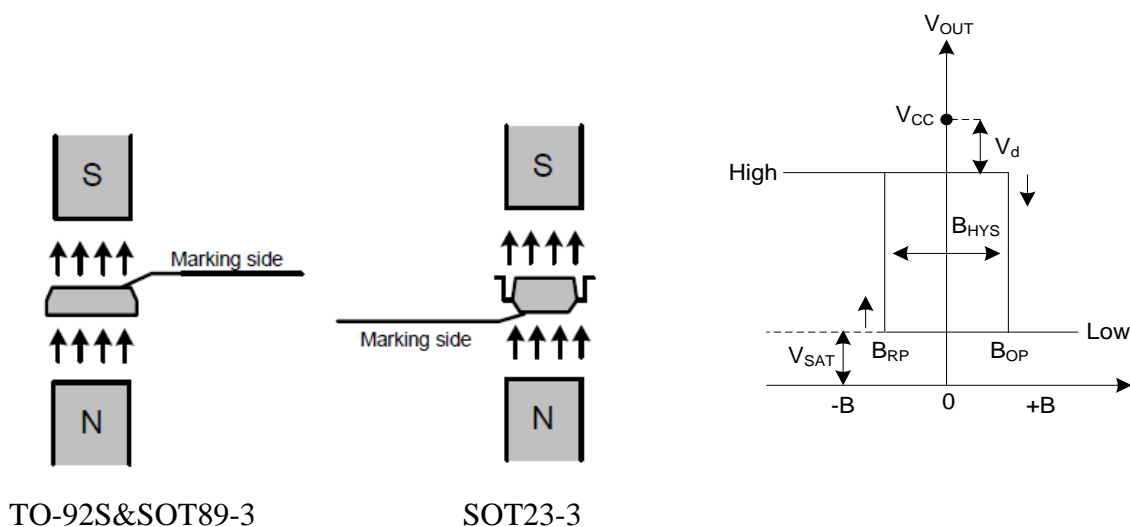
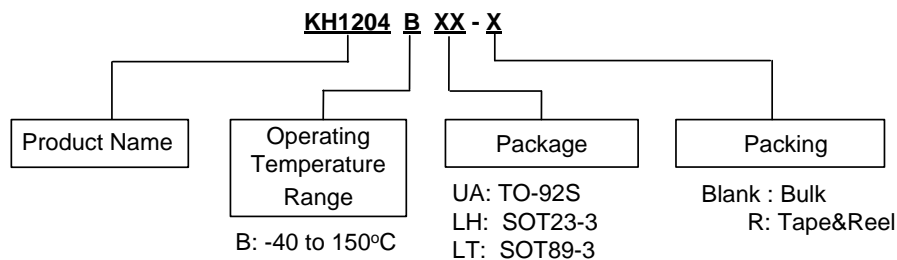


Figure 1. Output Voltage vs. Magnetic Flux Density

High Temperature Bipolar Hall Effect Position Sensor

Ordering Information



Package	Part Number	Marking ID	Packing Type
TO-92S	KH1204BUA	1204	1000/Bulk
SOT23-3	KH1204BLH-R	1204	3000/Tape&Reel
SOT89-3	KH1204BLT-R	1204	3000/Tape&Reel

Marking Information

Package Type: TO-92S



First lines: Marking ID
 Second line: Date Code
 Y: Year 0 to 9
 WW: Week 00 to 52 (Work week of molding)
 X: Internal Code

Package Type: SOT23-3



First lines: Marking ID

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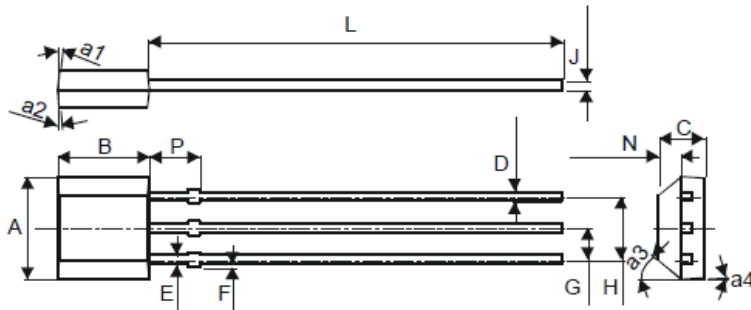
Package Type: SOT89-3



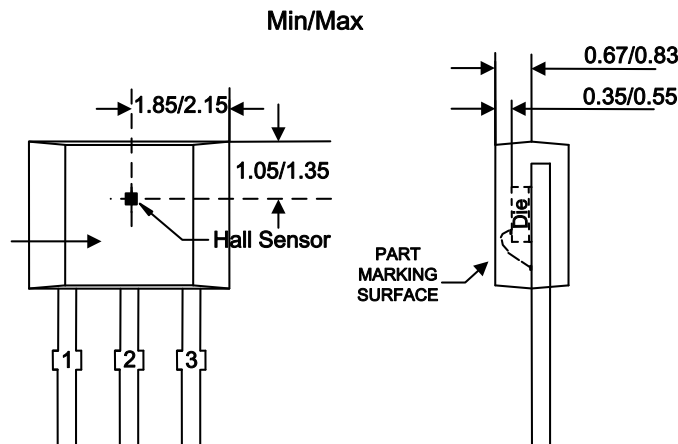
First lines: Marking ID
 Second line: Date Code
 Y: Year 0 to 9
 WW: Week 00 to 52 (Work week of molding)
 X: Internal Code

Package Outline Dimension

Package Type: TO-92S



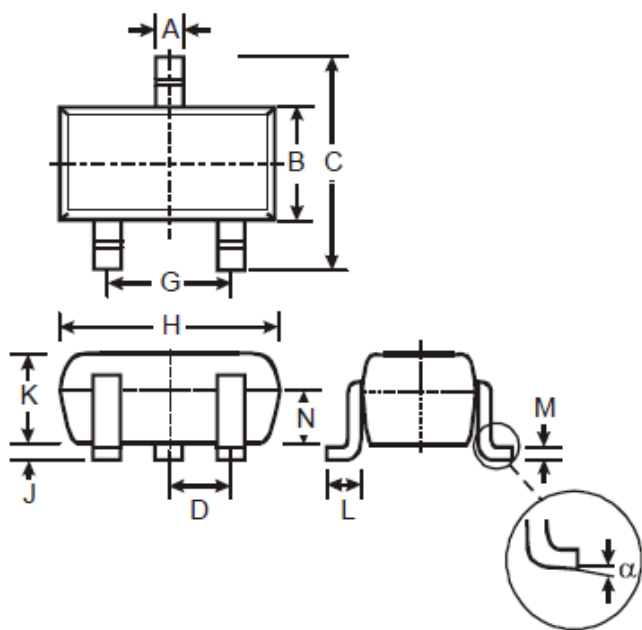
TO-92S		
Dim	Min	Max
A	4.0	4.2
a1	3° Typ	
a2	6° Typ	
a3	45° Typ	
a4	3° Typ	
B	3.08	3.28
C	1.48	1.68
D	0.36	0.56
E	0.44 Typ	
F	-0.05	0.20
G	1.27 Typ	
H	2.54 Typ	
J	0.38 Typ	
L	13.5	14.5
N	0.71	0.81
P	2.60	3.00
All Dimensions in mm		



Sensor Location

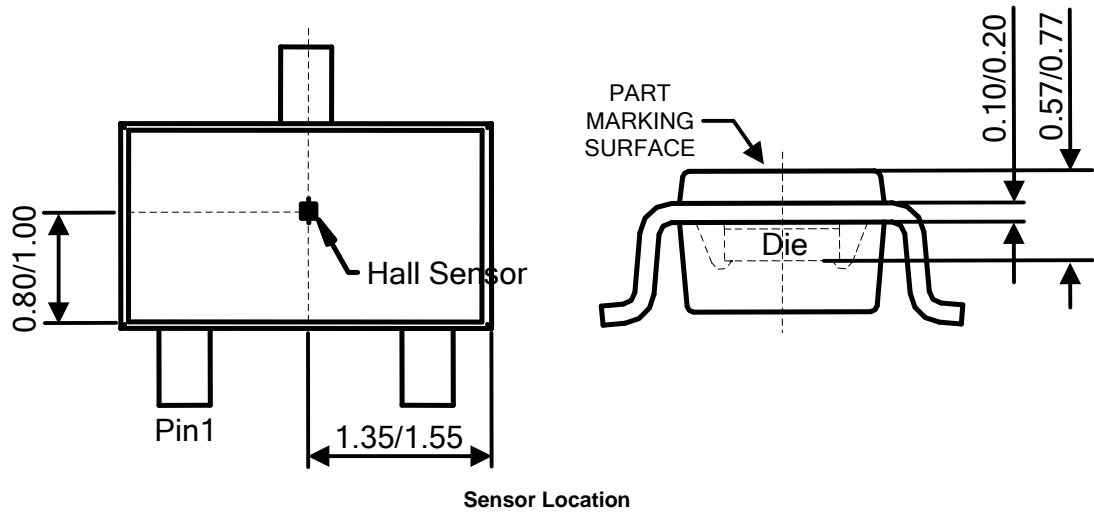
High Temperature Bipolar Hall Effect Position Sensor

Package Type: SOT23-3



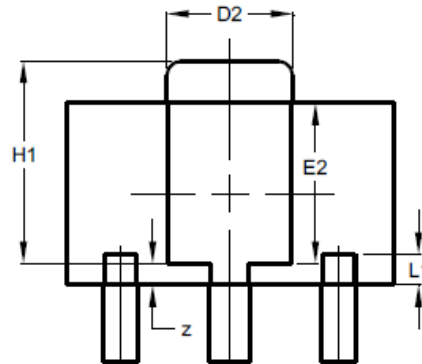
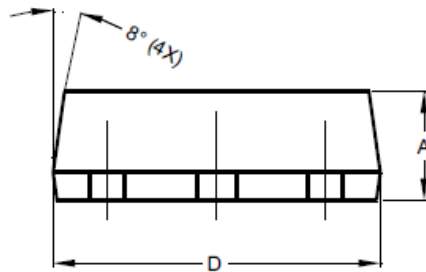
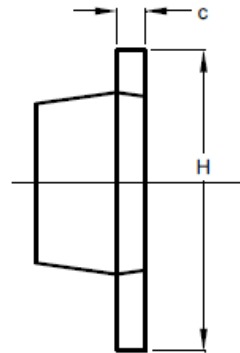
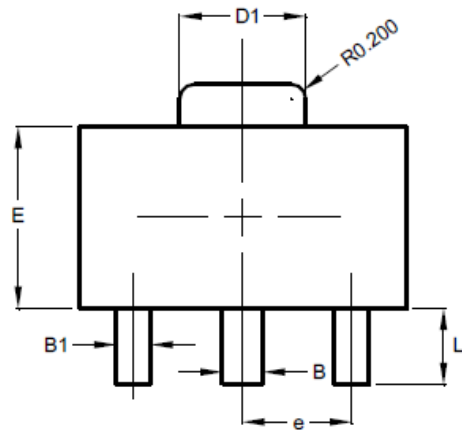
SOT23-3			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
G	-	-	1.90
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

Min/Max

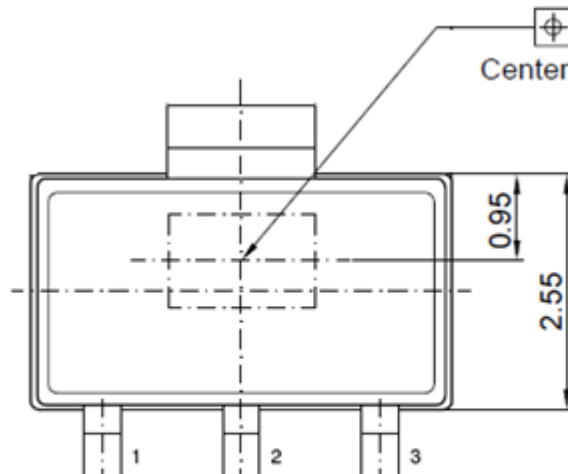


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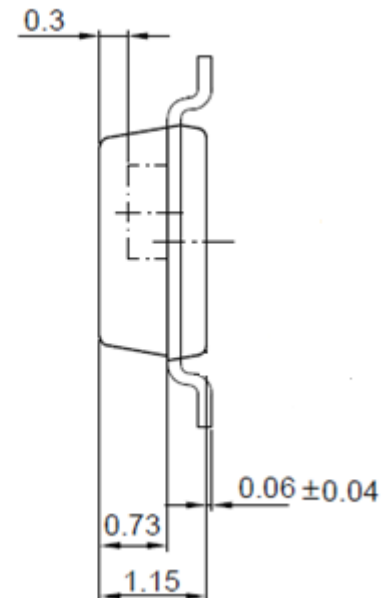
Package Type: SOT89-3



SOT89-3			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			



Center of sensitive area



Sensor Location

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