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# Hall Sensor

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# Hall Sensor

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## ■ INTRODUCTION

Hall Sensor is a magnetic sensor using Hall effect, generating output voltage directly proportional to magnetic field.

## ■ FEATURE AND APPLICATION

### ● Feature

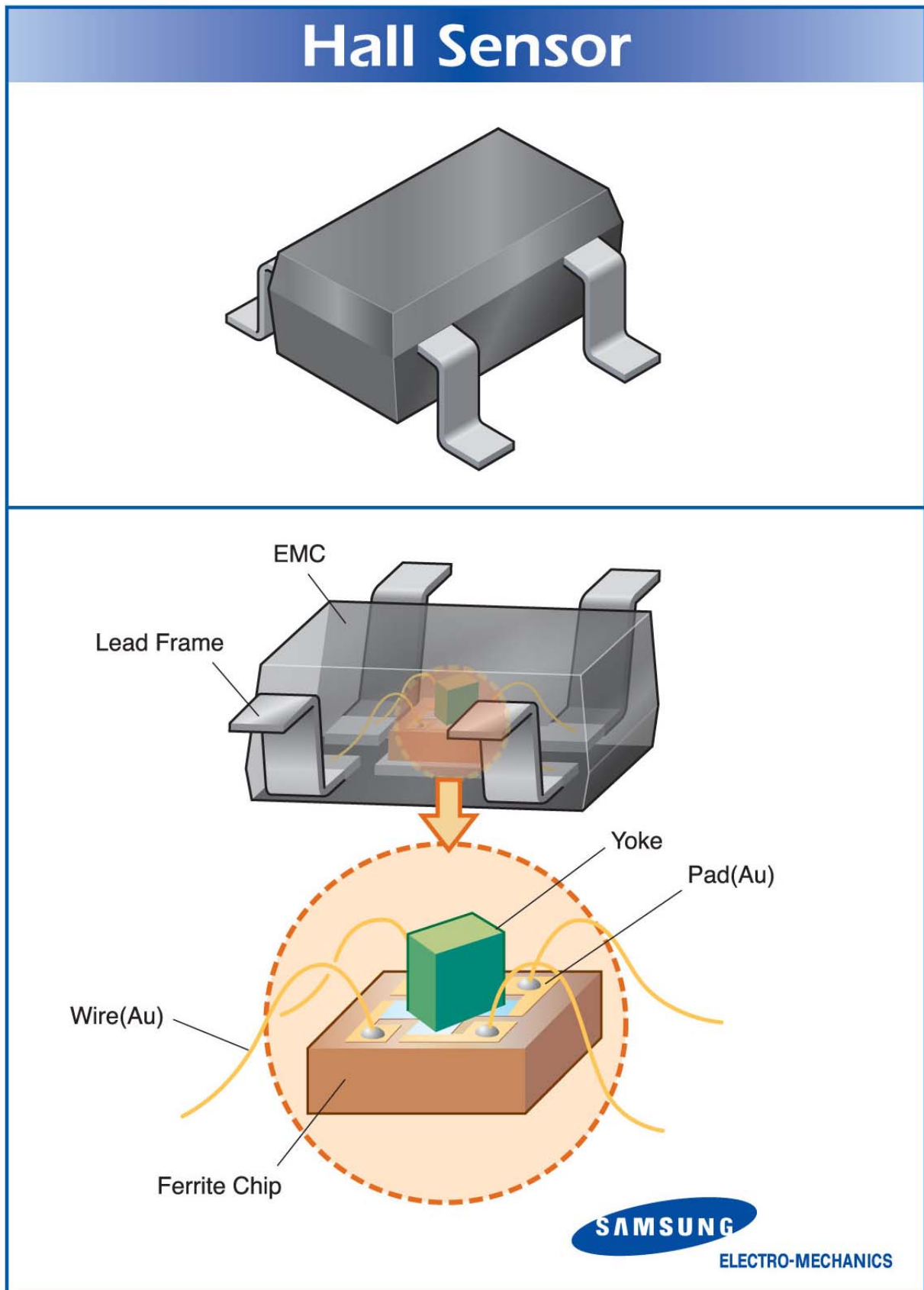
- SAMSUNG Hall Sensor is highly sensitive using evaporated InSb films.
- High value of output Hall voltage comes from the specially designed internal structure using magnetic substances.
- For high reliability, bonding pad layer is deposited by a vacuum process and connected with a lead frame using gold wire by wire-bonding technology.

### ● Application

- Detection for rotation and/or position of magnetic substances (ex: brushless dc motors, non-contact switches)
- Detection of magnetic fields (ex: non-contact current sensors, etc).

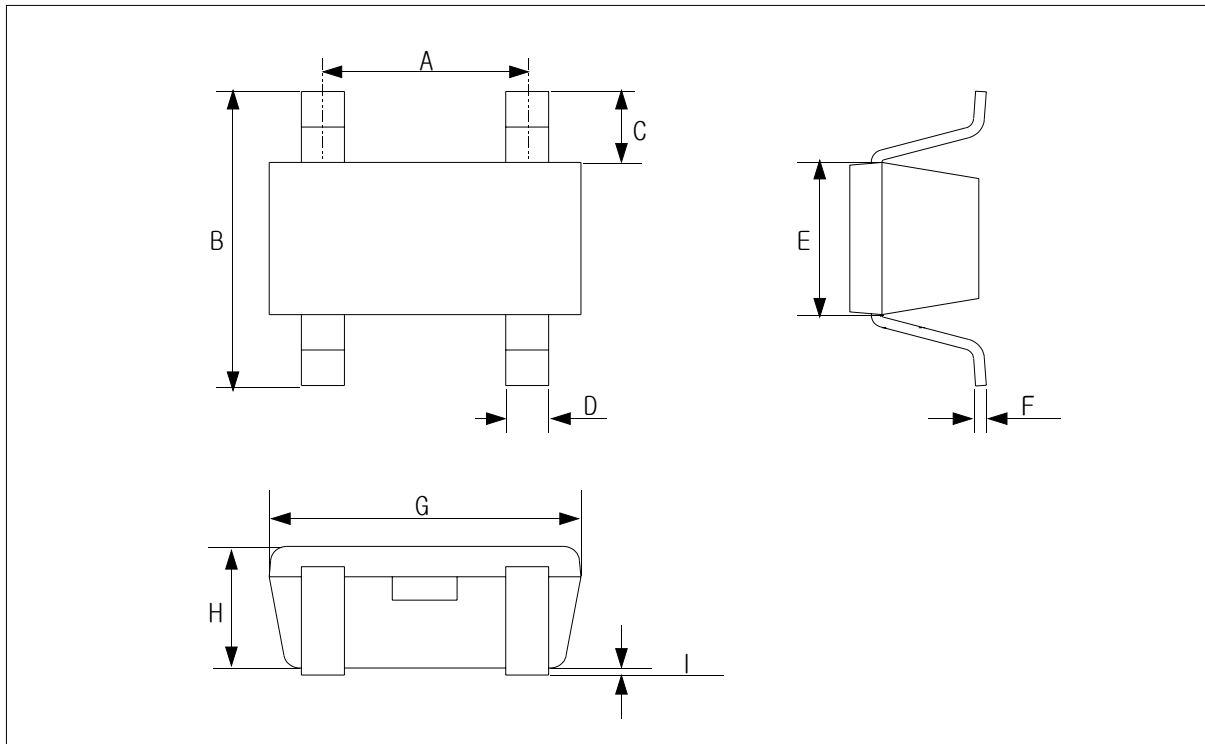
# Hall Sensor

## ■ STRUCTURE



# Hall Sensor

## ■ APPEARANCE AND DIMENSION

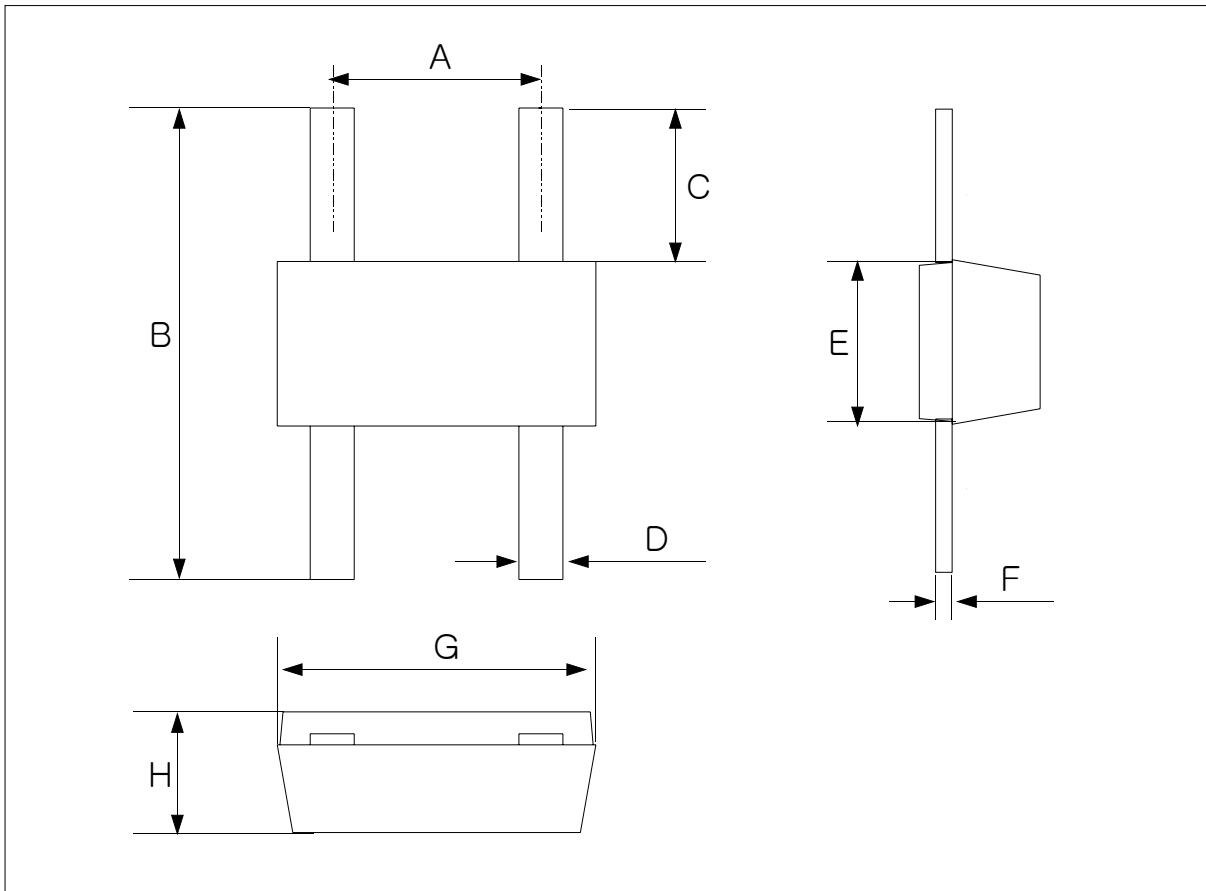


Model	DIMENSION ( mm )								
	A	B	C	D	E	F	G	H	I
HE12A※1U12	1.8 ±0.2	2.9 ±0.2	TYP. 0.7	0.4 ±0.1	1.5 ±0.1	0.1 ±0.05	2.9 ±0.1	1.1 ±0.1	MIN. 0.01
HE82A※1U12	1.3 ±0.2	2.1 ±0.2	TYP. 0.45	0.3 ±0.1	1.2 ±0.1	0.1 ±0.05	2.1 ±0.1	0.8 ±0.1	MIN. 0.01

(※ : Rank).

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## ■ APPEARANCE AND DIMENSION



Model	DIMENSION ( mm )							
	A	B	C	D	E	F	G	H
HE12B※1U12	1.8±0.2	3.9±0.2	TYP. 1.2	0.4±0.1	1.5±0.1	0.1 ±0.05	2.9±0.1	1.1±0.1

(※ : Rank).

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## ■ PART NUMBERING

<u>HE</u>	<u>1</u>	<u>2</u>	<u>A</u>	<u>E</u>	<u>1</u>	<u>U</u>	<u>1</u>	<u>2</u>
①	②	③	④	⑤	⑥	⑦	⑧	⑨

- ① Abbreviation of Hall Element
- ② Output Voltage Type
- ③ Pattern Type
- ④ Package Type
- ⑤ Rank Classification of Output Hall Voltage
- ⑥ Input Resistance Type
- ⑦ Taping Direction
- ⑧ Base Type
- ⑨ Package Substrate Plating Type

### ② OUTPUT VOLTAGE TYPE

The Hall element produces an output voltage proportional to a magnetic field and classified according to characteristic of the output voltage.

Symbol	Output Voltage Type
0	Linear type
1	High sensitive type
5	High sensitive type
8	High sensitive type

### ③ PATTERN TYPE

Classification according to difference of chip pattern. Give a number from 1 in order of development. Give odd number in case of asymmetry pattern, give even number in case of symmetry pattern

Symbol	Pattern Type
1	Asymmetry 1
2	Symmetry 1
3	Asymmetry 2
4	Symmetry 2
5	Asymmetry 3
6	Symmetry 3
.	.
.	.

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## ④ PACKAGE TYPE

Classification according to difference of package type which is clearly distinguished by shape. Give a character from A in order of development except I and O can be confused with number.

## ⑤ RANK CLASSIFICATION OF OUTPUT HALL VOLTAGE

Output Type	Symbol	Output Hall Voltage $V_H$ (mV)	Measurement Conditions
Linear Type	P	31 ~ 45	Vin = 1V, B = 500G Constant Voltage Drive
	Q	41 ~ 57	
	R	51 ~ 74	
High Sensitivity Type	A	122 ~ 150	
	B	144 ~ 174	
	C	168 ~ 204	
	D	196 ~ 236	
	E	228 ~ 274	
	F	266 ~ 320	

※ Please consult us for request of F rank.

## ⑥ INPUT RESISTANCE TYPE

Classification according to the input resistance type.

Symbol	Input Resistance Type
0	Asymmetry type
1	Symmetry type

## ⑦ TAPING DIRECTION

Classification according to the taping direction.

Symbol	Taping Direction
U	Marked side is upward
D	Marked side is downward
B	No taping

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## ⑧ BASE TYPE

Classification according to the base wafer type.

Symbol	Base Type
0	HIP(Hot Isostatic Press) type
1	CIP(Cold Isostatic Press) type

## ⑨ PACKAGE SUBSTRATE PLATING TYPE

Classification according to the package substrate plating type.

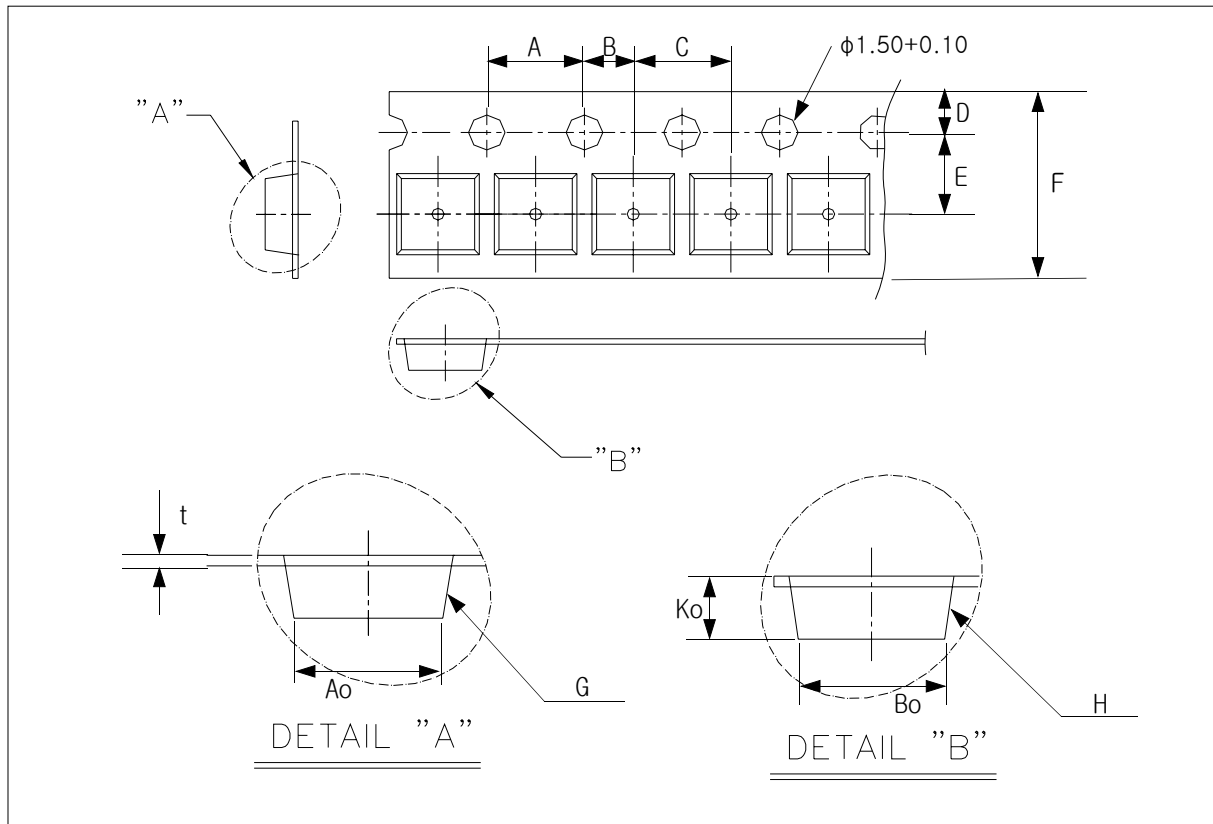
Symbol	Package Substrate Plating Type
0	Ag plating
1	SnPb plating
2	Sn plating



# Hall Sensor

## PACKAGING

### EMBOSSED PLASTIC TAPE



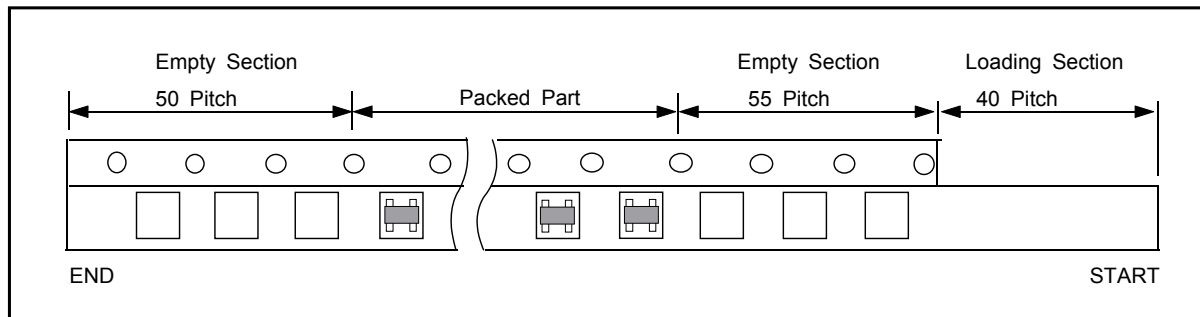
Model	DIMENSION ( mm )					
	A	B	C	D	E	F
HE12A※1U12	4.00±0.1	2.00±0.05	4.00±0.1	1.75±0.1	3.50±0.05	8.00±0.3
HE82A※1U12	4.00±0.1	2.00±0.05	4.00±0.1	1.75±0.1	3.50±0.05	8.00±0.3
HE12B※1U12	4.00±0.1	2.00±0.05	4.00±0.1	1.75±0.1	5.50±0.05	12.00±0.3

Model	DIMENSION ( mm )					
	G	H	A <sub>o</sub>	B <sub>o</sub>	K <sub>o</sub>	t
HE12A※1U12	MAX. 8°	MAX. 9°	3.05±0.1	3.00±0.1	1.35±0.1	0.229±0.02
HE82A※1U12	MAX. 8°	MAX. 5°	2.45±0.1	2.35±0.1	1.00±0.1	0.229±0.02
HE12B※1U12	MAX. 9°	MAX. 9°	4.50±0.1	3.00±0.1	1.30±0.1	0.229±0.02

(※ : Rank).

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## ● TAPING SIZE

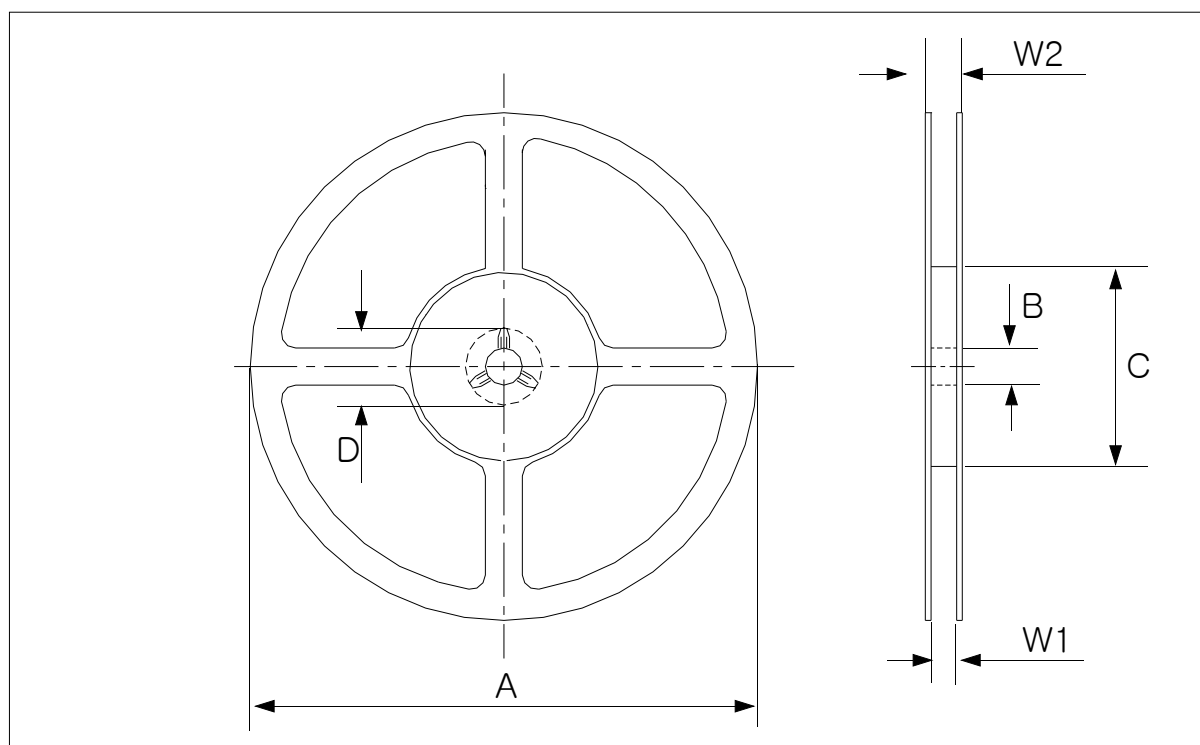


unit : pcs

Model	Reel Type	Taping Count	Packaging Tape
HE12A※1U12	7"	3000	Embossed Plastic Tape
HE82A※1U12	7"	4000	Embossed Plastic Tape
HE12B※1U12	7"	3000	Embossed Plastic Tape

(※ : Rank).

## ● REEL DIMENSION



unit : mm

Model	Reel	A	B	C	D	W1	W2
HE12A※1U12	7"	$\phi 178 \pm 2.0$	min. $\phi 60$	$\phi 13 \pm 0.5$	$27 \pm 0.8$	$9 \pm 0.3$	$11.4 \pm 1.0$
HE82A※1U12	7"	$\phi 178 \pm 2.0$	min. $\phi 60$	$\phi 13 \pm 0.5$	$27 \pm 0.8$	$9 \pm 0.3$	$11.4 \pm 1.0$
HE12B※1U12	7"	$\phi 178 \pm 2.0$	min. $\phi 60$	$\phi 13 \pm 0.5$	$27 \pm 0.8$	$16 \pm 0.3$	$18.4 \pm 1.0$

(※ : Rank).

# Hall Sensor

## ■ RELIABILITY TEST DATA

### ● TEST ITEM AND CONDITION

NO	ITEM	TEST CONDITION
1	HIGH TEMPERATURE STORAGE TEST	150℃, t=1000HR
2	HIGH TEMPERATURE OPERATION TEST	Ta=120℃, I=10mA, t=1000HR
3	LOW TEMPERATURE OPERATION TEST	Ta=-40℃, I=6mA, t=1000HR
4	HIGH TEMPERATURE HIGH HUMIDITY OPERATION TEST	85℃, 85%RH, I=9mA, t=1000HR
5	PCT	121℃, 100%RH, 2atm, t=24HR
6	THERMAL SHOCK	-55℃(30min) ↔ 150℃(30min), 30cycle
7	HIGH HUMIDITY TEMPERATURE CYCLE	-20℃(30min) ↔ 85℃(30min), 95%RH, 40cycle
8	SOLDERING HEAT RESISTANCE	Peak Temp=260℃, t=10sec, Reflow
9	SOLDERABILITY	Peak Temp=260℃, t=5sec, Reflow, Over 95%
10	ESD(MM)	V=500V, C=200pF, R=0Ω (EIAJ TEST CONDITION)
11	VIBRATION TEST	Frequency:10~55 Hz, Amplitude:1.5mm(p-p), Sweep Time 1min, X, Y, Z Each Direction 2HR
12	IMPACT TEST	1500G, 0.5ms, Half Sine Wave Pulse, 3 Impacts Per Axis
13	TERMINAL STRENGTH	Pulling Strength Over 0.5Kg, 30mm/min
14	BENDING TEST	Speed:30mm/min, Push:3mm, Hold:5sec, 3 Times
15	BOARD SHEAR TEST	Push Speed 30mm/min, Over 0.5Kg

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## ● CRITERION FOR JUDGING

After each reliability test, samples should be kept for at least 24 hrs at room temperature and humidity, and then measured. The change rates should be confined within the ranges as follows.

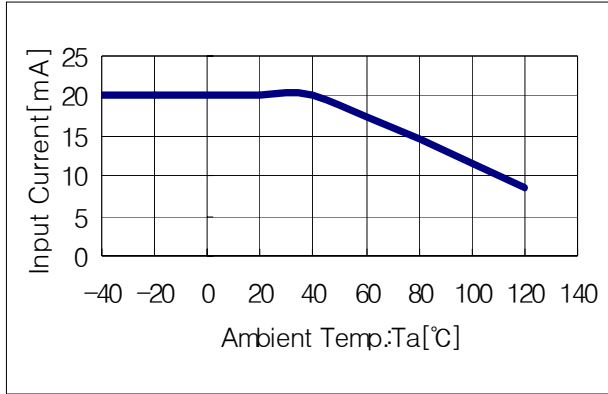
ITEM	OK SPEC	NG/OK
$\Delta R_{in}$	UNDER $\pm 20\%$	OK (SPEC SATISFYING)
$\Delta R_{out}$	UNDER $\pm 20\%$	
$\Delta V_H$	UNDER $\pm 20\%$	
$\Delta V_o/V_H$	UNDER $\pm 5\%$	

# Hall Sensor

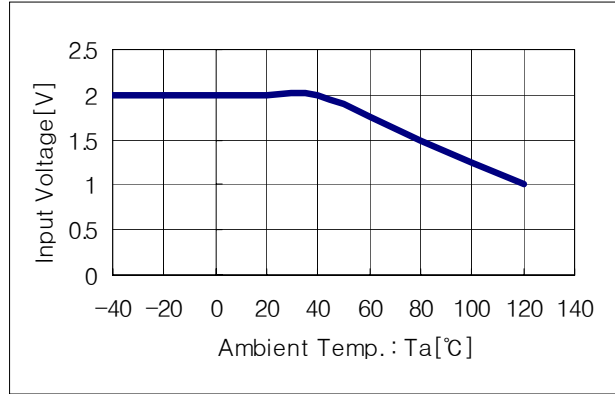
## CHARACTERISTIC GRAPH

### ELECTRICAL CHARACTERISTICS

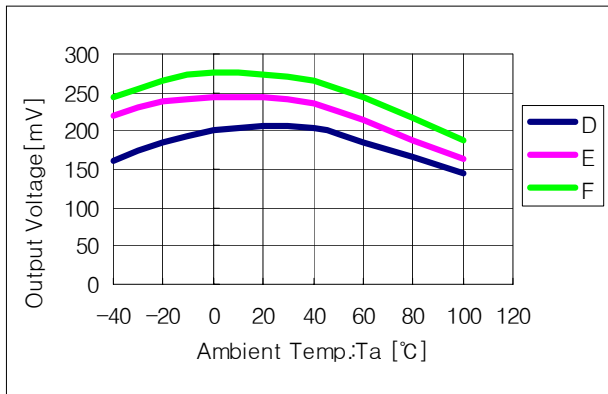
►  $I_c - T$



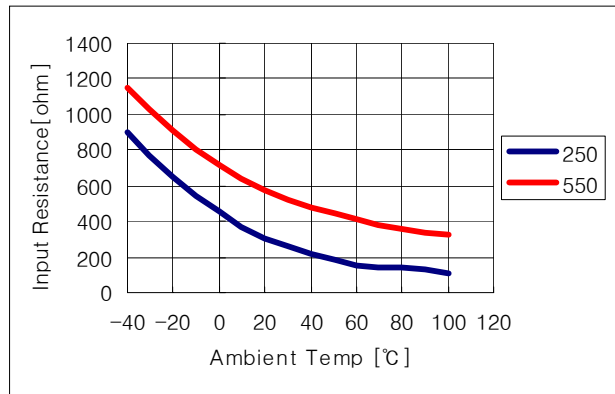
►  $V_c - T$



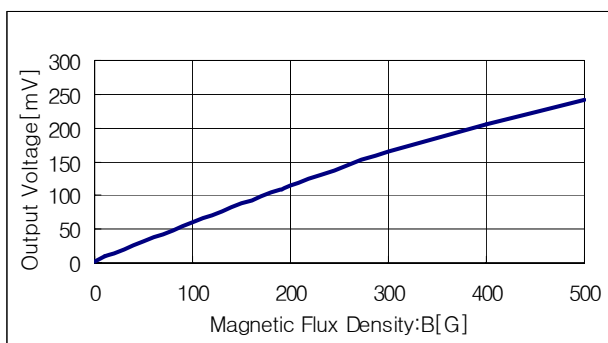
►  $V_h - T_a$



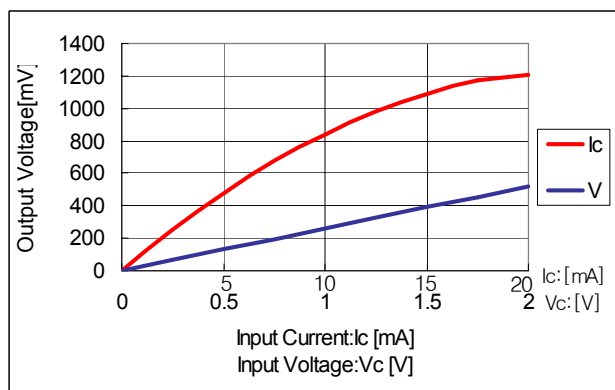
►  $R_{in} - T_a$



►  $V_h - B$  ( $V_{in}$  const)

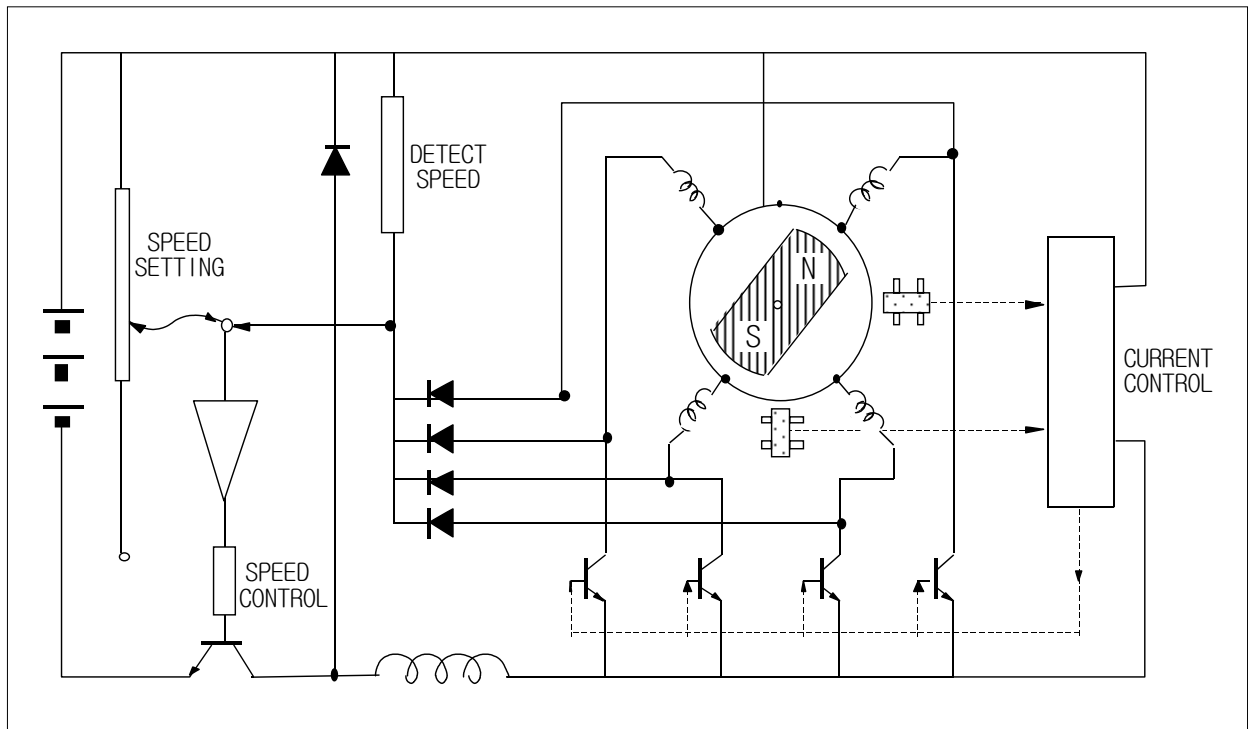


►  $V_h - V_c, V_h - I_c$



# Hall Sensor

## ■ BLOCK DIAGRAM



# Hall Sensor

## APPLICATION MANUAL

### METHOD FOR MOUNTING (SnPb Plating)

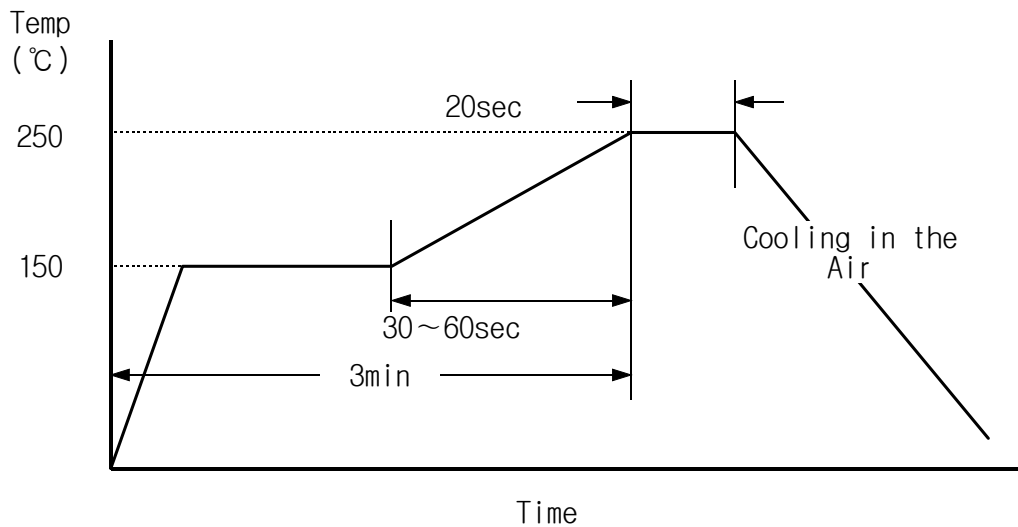
#### Soldering Conditions on PCB

- ① No Rapid Heating and Cooling.
- ② Recommended Preheating condition is at 130~150°C for 2~3minutes.
- ③ Recommended Reflowing condition is at 220~230°C for 10~15seconds.

#### Soldering Method and Temperature

Item	Methods	Temperature
Reflow	Soldering by Passing the Heated Zone	Max 250°C in 20sec
Solder Iron	Soldering by Soldering Iron	Max 300°C in 3sec

#### Reflow Method



# Hall Sensor

## ● METHOD FOR MOUNTING (Sn Plating)

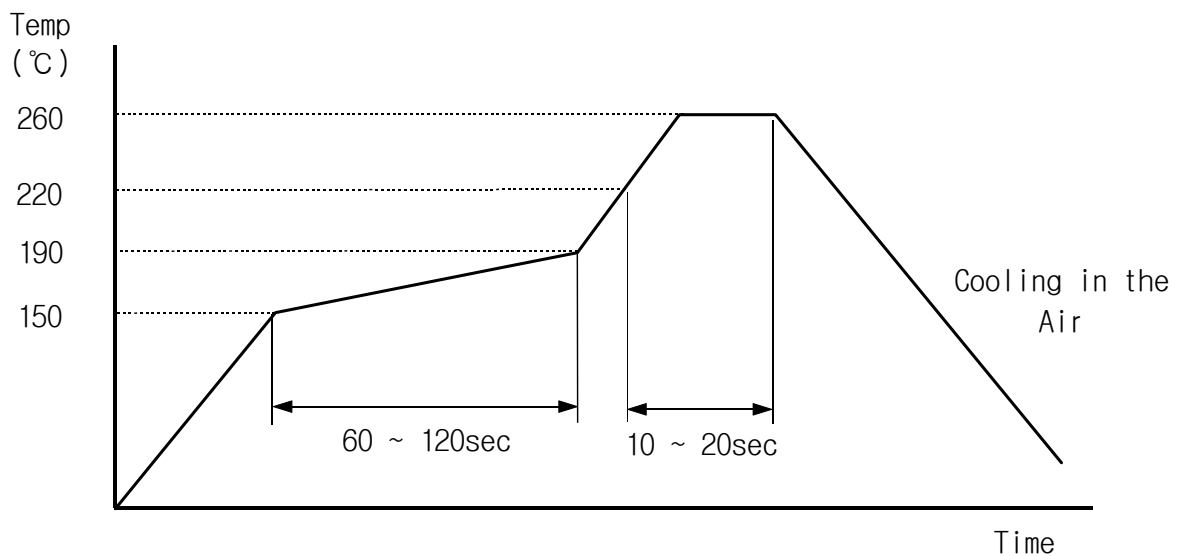
### ▶ Soldering Conditions on PCB

- ① No Rapid Heating and Cooling.
- ② Recommended Preheating condition is at 150~190°C for 1~2minutes.
- ③ Recommended Reflowing condition is at 220~260°C for 10~20seconds.

### ▶ Soldering Method and Temperature

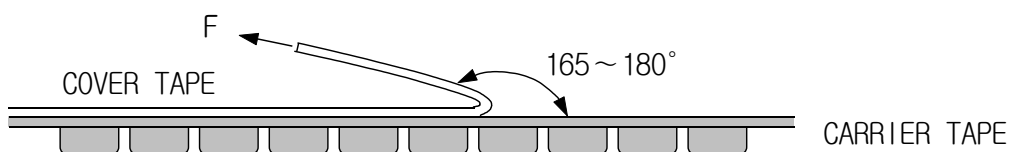
Item	Methods	Temperature
Reflow	Soldering by Passing the Heated Zone	Max 260°C in 10sec
Solder Iron	Soldering by Soldering Iron	Max 350°C in 3sec

### ▶ Reflow Method



### ▶ Tape Specifications

Pull Strength(F) = 20~70g





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## ■ NOTICE

Devices should be kept below 40 °C and below RH80% in the shade.