SAMSUNG ELECTRO-MECHANICS

LEAD-FREE

SPECIFICATION

MODEL : HED57XXU12

Low Power Hall-Effect Switch

DRAWN	CHECKED	APPROVED
		
S.W. PARK	S.W. KIM	H.C. JOUNG
2006.9.19	2006.9.19	2006.9.19

SAMSUNG ELECTRO-MECHANICS CO.,LTD.
314,Maetan 3-Dong,Yeongtong-Gu,Suwon,
Kyunggi-Do,KOREA,443-743

Revision history
(Model : HED57XXU12)

Date	Rev. No	Contents revised	Design	Approval
2006.9.19	0	Establishment	S.W.Park	H.C.Joung

1. Description

The HED57XXU12 Omnipolar Hall effect sensor IC is fabricated on mixed signal CMOS technology. It incorporates advanced dynamic offset cancellation techniques to provide accurate and stable magnetic switch points. The circuit design provides an internally controlled clocking mechanism to cycle power to the Hall element and analog signal processing circuits.

This serves to place the high current-consuming portions of the circuit into a sleep mode. Periodically the device is awakened by this internal logic and the magnetic flux from the Hall element is evaluated against the predefined thresholds. If the flux density is above or below the B_{OP}/B_{RP} thresholds then the output transistor is driven to change states accordingly.

While in the sleep cycle the output transistor is latched in its previous state. The design has been optimized for service in applications requiring extended operating lifetime in battery powered systems.

The output transistor of the HED57XXU12 is switched on (B_{OP}) in the presence of a sufficiently strong South or North magnetic field. The output is switched off (B_{RP}) in the absence of a magnetic field.

2. Specification

2.1 Absolute Maximum Ratings

① Supply Voltage, V_{DD} : 5V
② Output Voltage, V_{OUT} : 5V
③ Output Current, I_{OUT} :10mA
④ Operating Temperature range (T_A) : -40℃ to 85℃
⑤ Storage Temperature range (T_S) : -55℃ to +150℃
⑥ ESD Sensitivity : MM 500V, HBM 5000V
⑦ Exceeding the absolute maximum ratings may cause fatal damage.

2.2 HED57XXU12 Electrical Specification

[Operating conditions Ta=25°C, V_{DD}=2.5V to 3.5V]

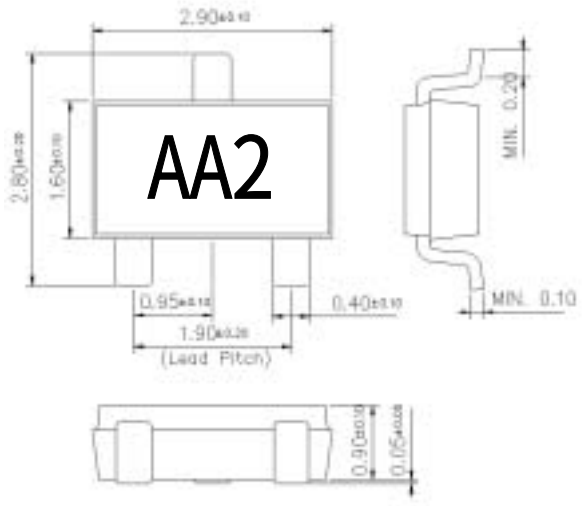
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Supply Voltage	V_{DD}	Operating	2.5	2.75	3.5	V
Supply Current	I_{DD}	Awake, V_{DD}=3.5V	-	3.0	5.0	mA
	I_{SL}	Sleep, V_{DD}=3.5V	-	3.5	6.0	μA
	I_{AVG}	Average, V_{DD}=3.5V	-	6.5	10.0	μA
LOW Level Output Voltage	V_{LOW}	B>B_{OP}, I_{OUT}=1mA	0.0	0.25	0.4	V
Output Leakage Current	I_{LEAK}	B<B_{RP}, V_{DD}=3.5V	-	-	1.0	μA
Awake mode time	T_{AWK}	Operating	-	50	120	μs
Sleep mode time	T_{SL}	Operating	-	40	60	ms

2.3 HED57XXU12 Magnetic Specifications

[Operating conditions Ta=25°C, V_{DD}=2.5V to 3.5V]

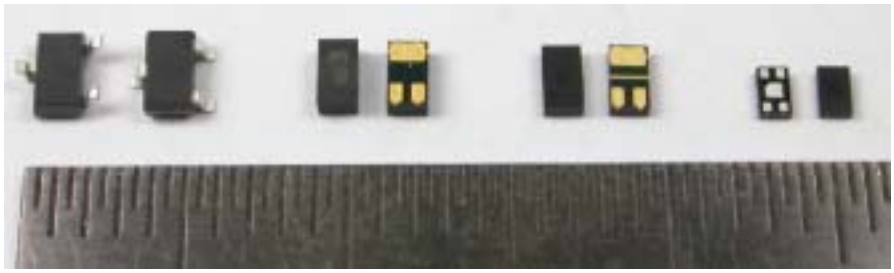
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Operate Point	B_{OP}	Operating	-	±38	±55	G
Release Point	B_{RP}	Operating	±10	±28	-	G
Hysteresis	B_{HYS}	$IB_{OP} - B_{RP}I$	3	10	23	G

3. Package Dimensions [Unit : mm , Tolerance : ±0.10㎜]



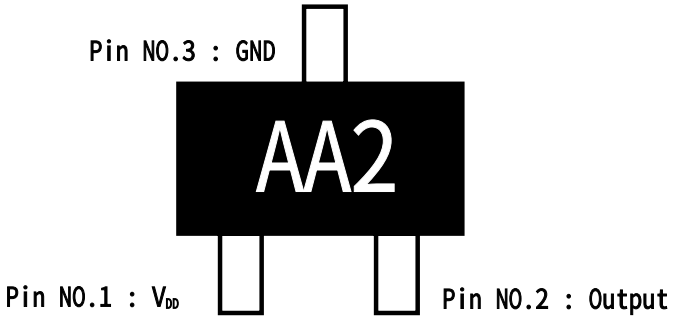
[Outline] [Hall Pattern Location]

HED57XXU12 HED52XXU12 HED56XXU11 HED58XXU12



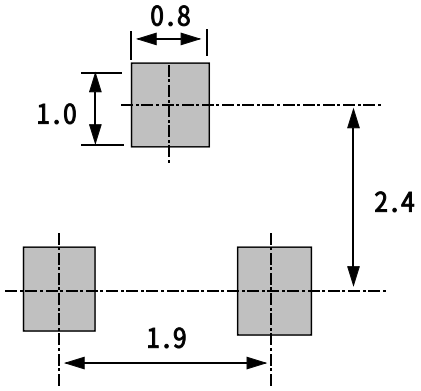
4. Pinning

Pinning is shown viewed from ***marked side***

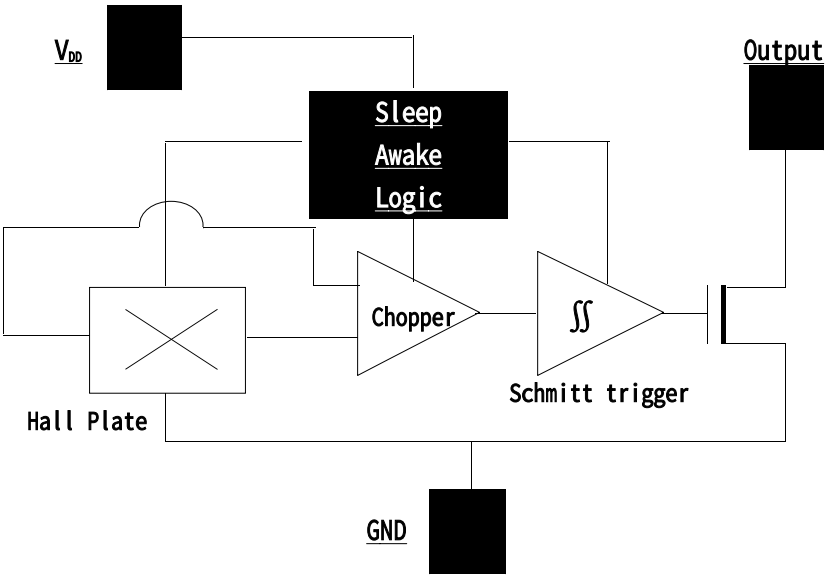


[HED57XXU12]

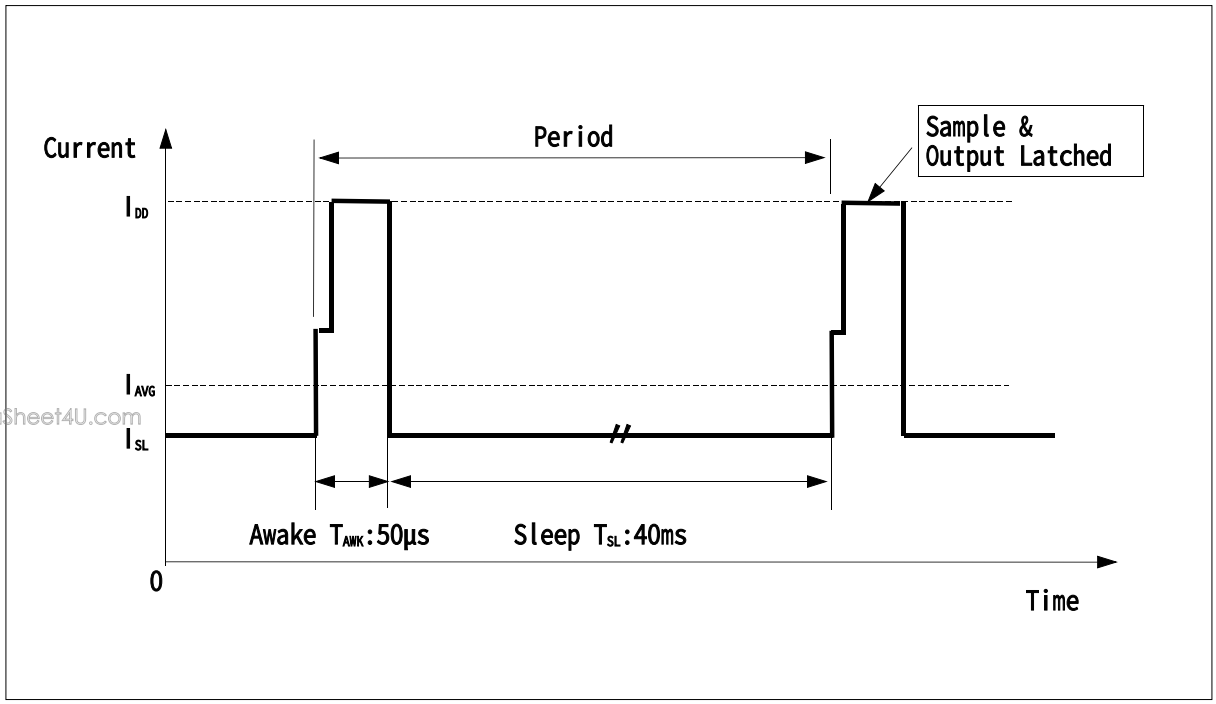
5. Recommended Land Pattern [Unit : mm]



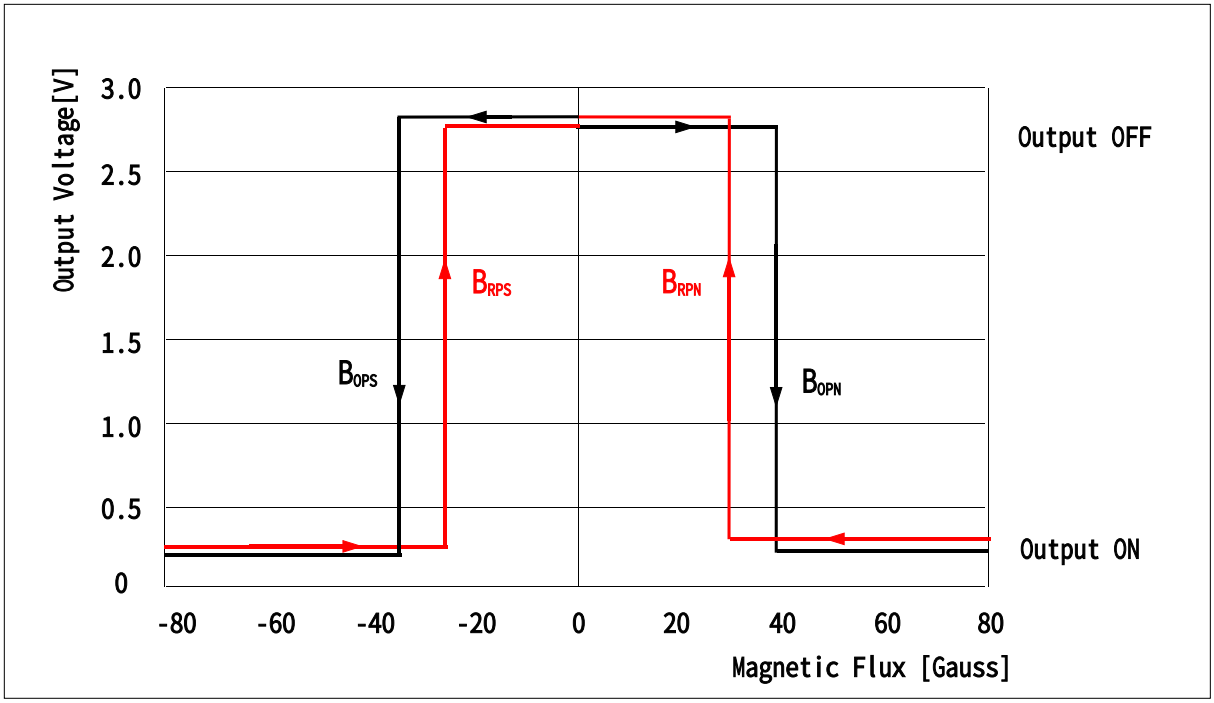
6. Functional Diagram



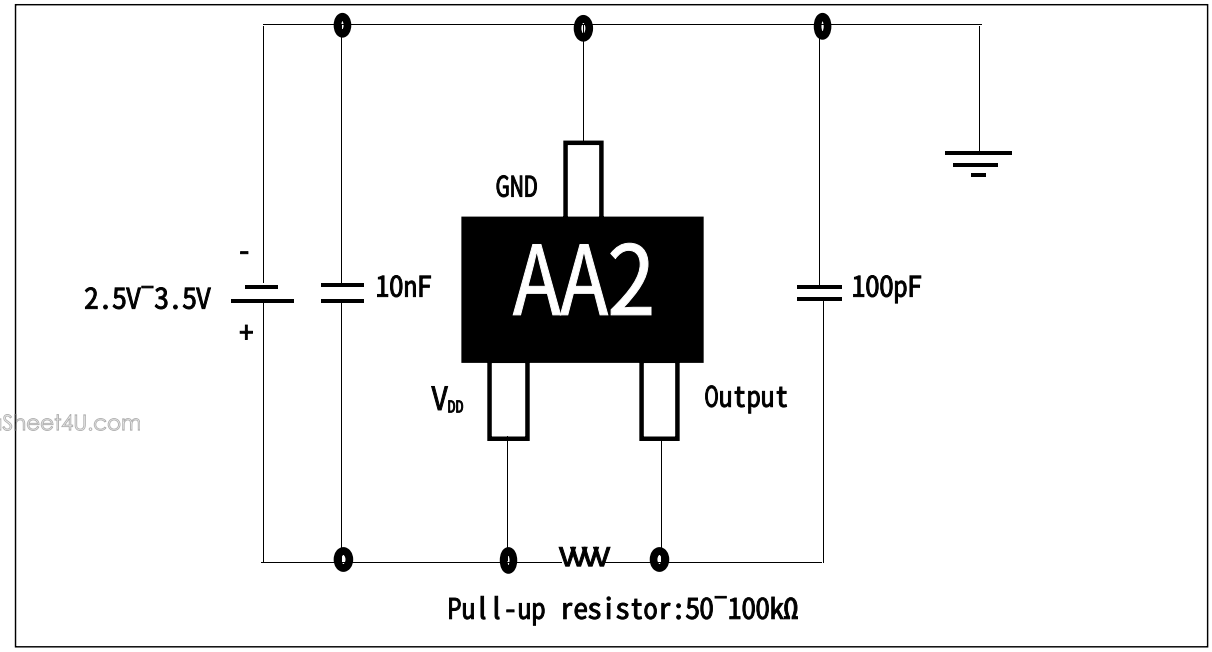
7. Internal Timing Circuit



8. Output Switching Characteristics



9. Typical Application



10. Endurance test specification

-Test Items and Test Conditions

10.1 Environmental Test

NO	Test Item	Test Condition	Test Length	Fail/Samples
1	High Temp. Storage Test	Ta=170℃	500hrs	0/20
2	Low Temp. Storage Test	Ta=-40℃	500hrs	0/20
3	High Temp. Operation Test	Ta=150℃, V_{DD}=3V	408hrs	0/20
4	High Temp. High Humidity Operation Test	Ta=130℃, V_{DD}=3V, 85%RH	50hr	0/20
5	P.C.T.	Ta=121℃, 100%RH, 2atm.	96hr	0/20
6	Thermal Shock Test	-65℃(30min) ↔ 150℃(30min)	500cycles	0/20
7	Soldering Heat Resistance Test	Peak Temp = 260±5℃, Preheating = 150~180℃	2times	0/20

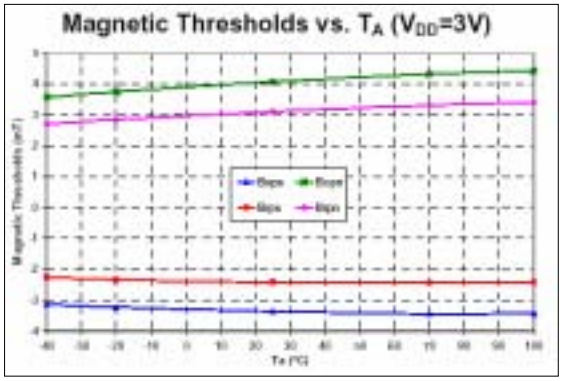
10.2 Mechanical Test

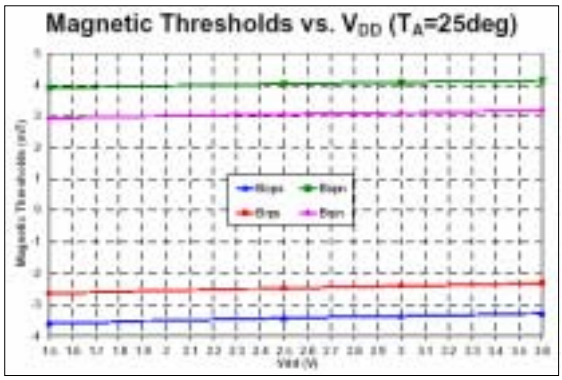
NO	Test Item	Test Condition	Fail/Samples
1	Vibration Test	Freq. : 10~55Hz, Amplitude : 1.5mm, sweep time 1min, 2hrs per axis(X.Y.Z)	0/20
2	Impact Test	3000g's, 0.5mm, Half sine wave pulse, 3 impacts per axis.	0/20

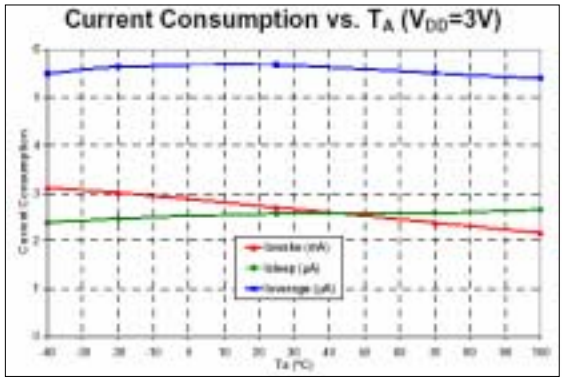
10.3 Electrical Test

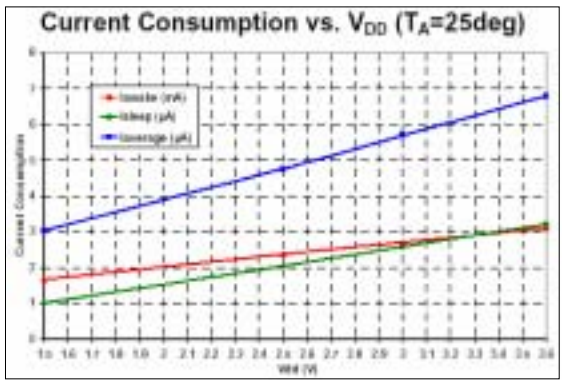
NO	Test Item	Test Condition	Test Length	Fail/Samples
1	ESD	HBM : R1=10MΩ, R2=1.5kΩ, C=100pF, 1sec All Leads >6kV	3times	0/20
		MM : R1=10MΩ, R2=0Ω,C=200pF, 1sec All Leads >600V	3times	0/20

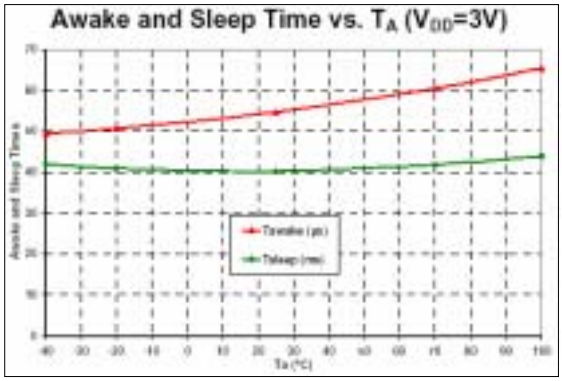
11. Performance Graphs

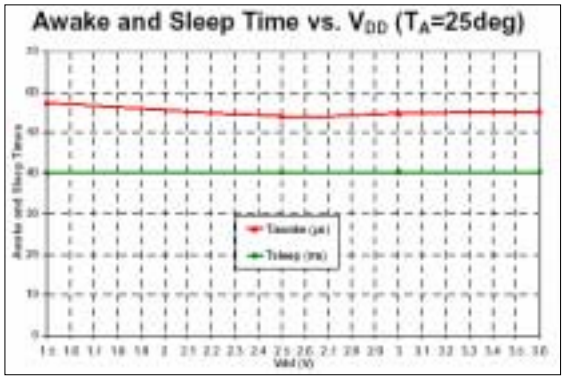


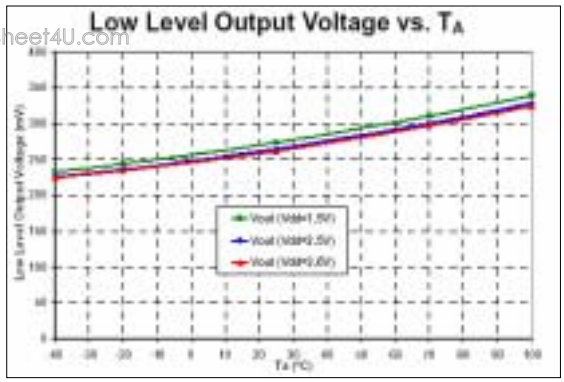










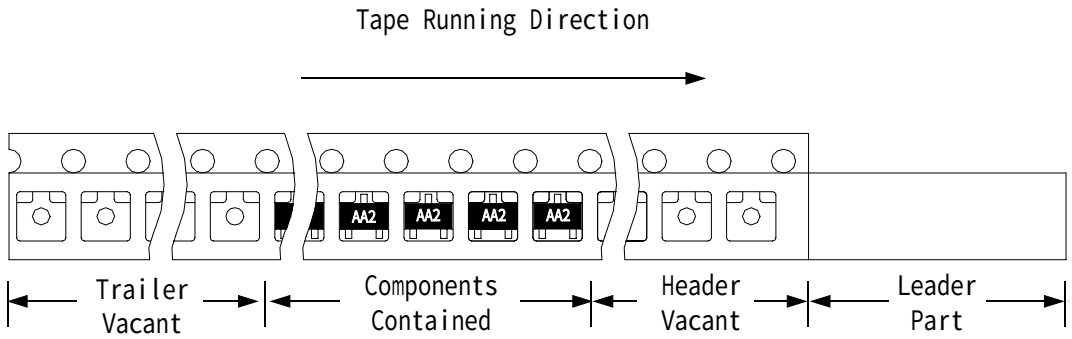


12. Packaging

12.1 Taping

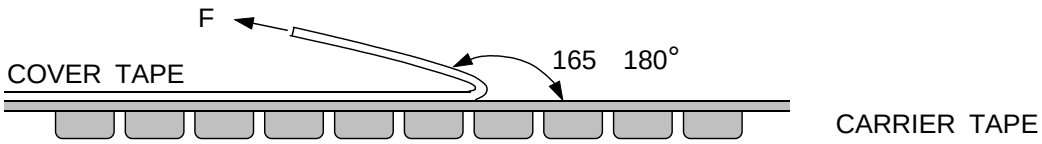
① HED57XXU12 should be packed, that marking surface shown through cover tape.

② At least, 20㎝ vacant parts are made both front and rear side of tape.



12.2 Tape Specifications

① Pull Strength(F) = 20 70g

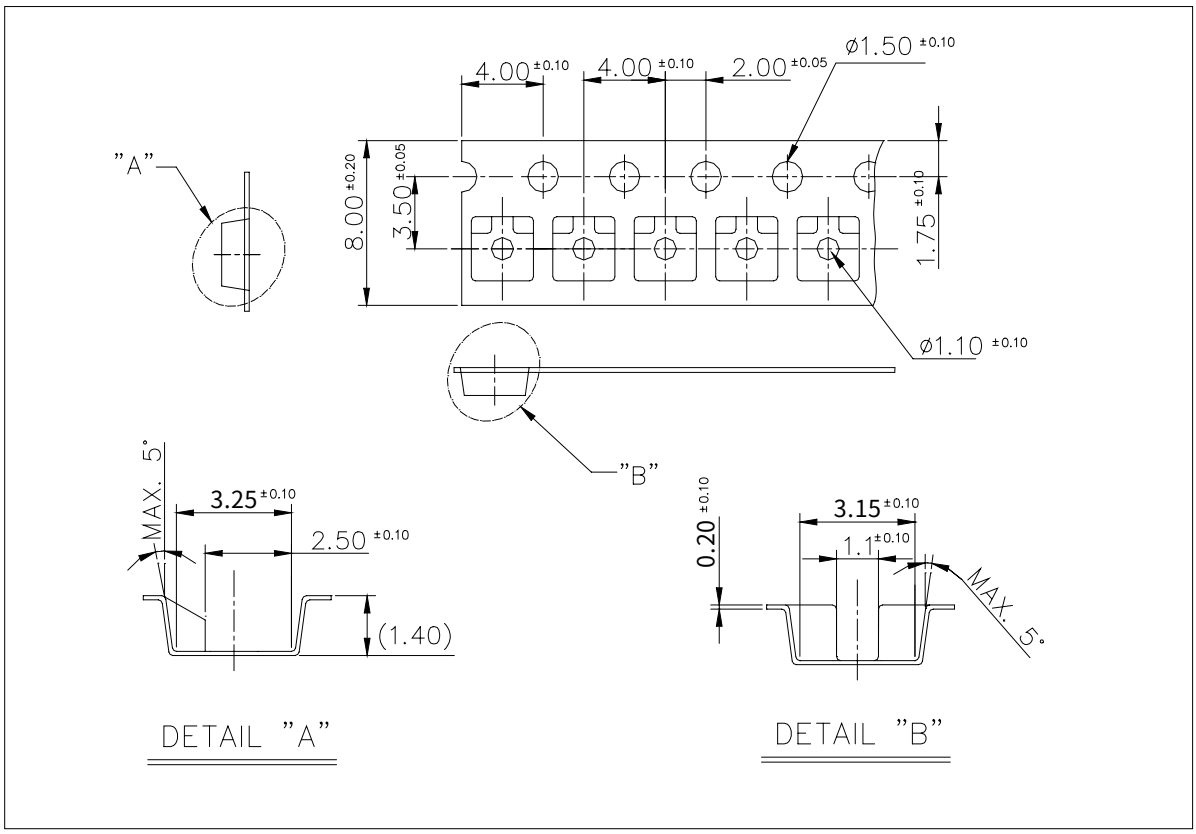


② Devices should not run out of a pocket when tape is bent down 15mm curvature.
③ Devices should not stick to cover tape.
④ Devices should be kept below 40℃ and below RH80% in the shade.
⑤ Tape has no joint.

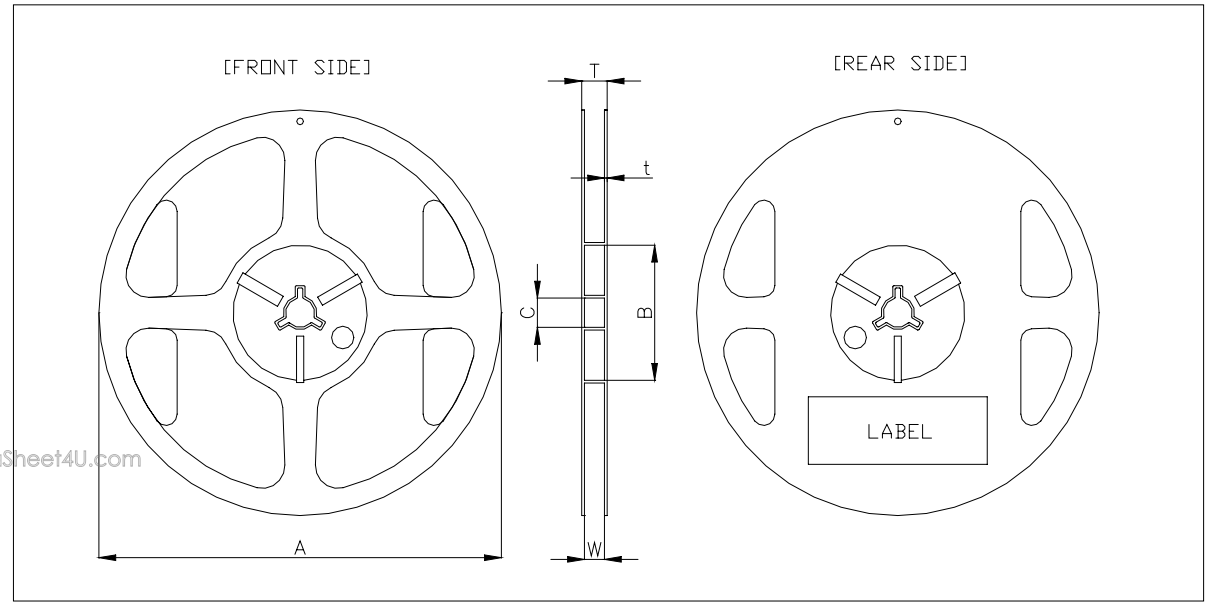
12.3 Packing Unit

① 3,000pcs of devices are packed in one reel.
② Ten reels(30,000pcs) are packed in one box.
③ Dummy could be packed for safe dealing.

12.4 Carrier Tape [Unit : mm]



12.5 Reel [Unit : mm]



Symbol	A	B	C	W	T	t
Spec.	Ø180+0 -3	Ø60+1 -0	Ø13±0.3	9±0.3	11.4±1.0	Max. 2.0

※ This REEL is made of PLASTIC and can be recycled.

12.6 Marking Table

① Use Laser Marker

② Weekly Mark Table

Week	Mark	Week	Mark	Week	Mark	Week	Mark	Week	Mark	Week	Mark	Week	Mark
06/40	**FP2**	07/03	**GF2**	07/19	**GV2**	07/35	**HP2**	07/51	**IJ2**	08/14	**JE2**	08/30	**JU2**
06/41	**FQ2**	07/04	**GG2**	07/20	**GW2**	07/36	**HQ2**	07/52	**IK2**	08/15	**JF2**	08/31	**JV2**
06/42	**FR2**	07/05	**GH2**	07/21	**GX2**	07/37	**HR2**	07/53	**IL2**	08/16	**JG2**	08/32	**JW2**
06/43	**FS2**	07/06	**GI2**	07/22	**GY2**	07/38	**HS2**	08/01	**IM2**	08/17	**JH2**	08/33	**JX2**
06/44	**FT2**	07/07	**GJ2**	07/23	**GZ2**	07/39	**HT2**	08/02	**IP2**	08/18	**JI2**	08/34	**JY2**
06/45	**FU2**	07/08	**GK2**	07/24	**HA2**	07/40	**HU2**	08/03	**IQ2**	08/19	**JJ2**	08/35	**JZ2**
06/46	**FV2**	07/09	**GL2**	07/25	**HB2**	07/41	**HV2**	08/04	**IR2**	08/20	**JK2**	08/36	**KA2**
06/47	**FW2**	07/10	**GM2**	07/26	**HC2**	07/42	**HW2**	08/05	**IT2**	08/21	**JL2**	08/37	**KB2**
06/48	**FX2**	07/11	**GN2**	07/27	**HD2**	07/43	**HY2**	08/06	**IU2**	08/22	**JM2**	08/38	**KC2**
06/49	**FY2**	07/12	**GO2**	07/28	**HE2**	07/44	**IA2**	08/07	**IV2**	08/23	**JN2**	08/39	**KD2**
06/50	**FZ2**	07/13	**GP2**	07/29	**HF2**	07/45	**IB2**	08/08	**IW2**	08/24	**JO2**	08/40	**KE2**
06/51	**GA2**	07/17	**GQ2**	07/30	**HG2**	07/46	**IC2**	08/09	**IY2**	08/25	**JP2**	08/41	**KF2**
06/52	**GB2**	07/15	**GR2**	07/31	**HJ2**	07/47	**ID2**	08/10	**JA2**	08/26	**JQ2**	08/42	**KG2**
06/53	**GC2**	07/16	**GS2**	07/32	**HK2**	07/48	**IE2**	08/11	**JB2**	08/27	**JR2**	08/43	**KH2**
07/01	**GD2**	07/17	**GT2**	07/33	**HL2**	07/49	**IF2**	08/12	**JC2**	08/28	**JS2**	08/44	**KI2**
07/02	**GE2**	07/18	**GU2**	07/34	**HM2**	07/50	**IG2**	08/13	**JD2**	08/29	**JT2**	08/45	**KJ2**

12.7 Label Code Numbering

[Reel Label]

Shift
A,B,C or N
TAPING NO.
1~9 : Machine NO.

REEL NO : I001~I999

LOT NO : 001~999

The day of manufacture
1~9 : 1st~9th, A: 10th, B: 11th, C: 12th ~

The month of manufacture
1~9 : Jan.~ Sept., A: Oct., B: Nov., C: Dec.

The year of manufacture
P : 2005 , Q : 2006 ~

Type of product
A : Normal, B : Bulk, C : Initial
R : Rework, S : Sample

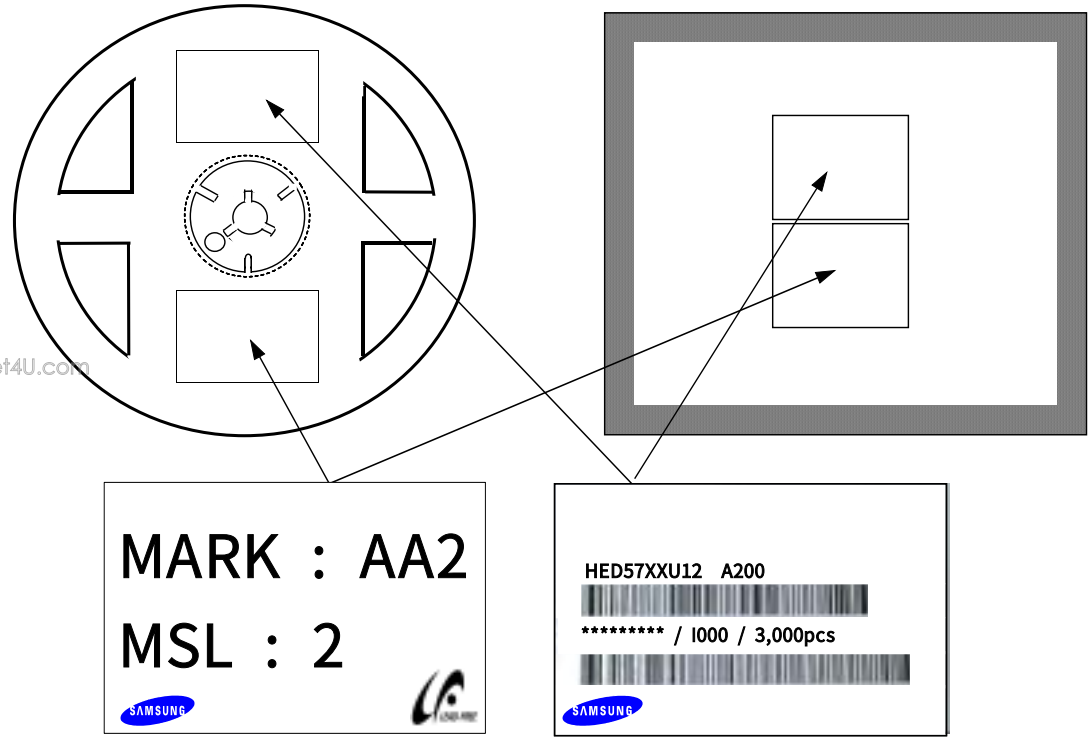
Sub-Contractor

[Box Label]

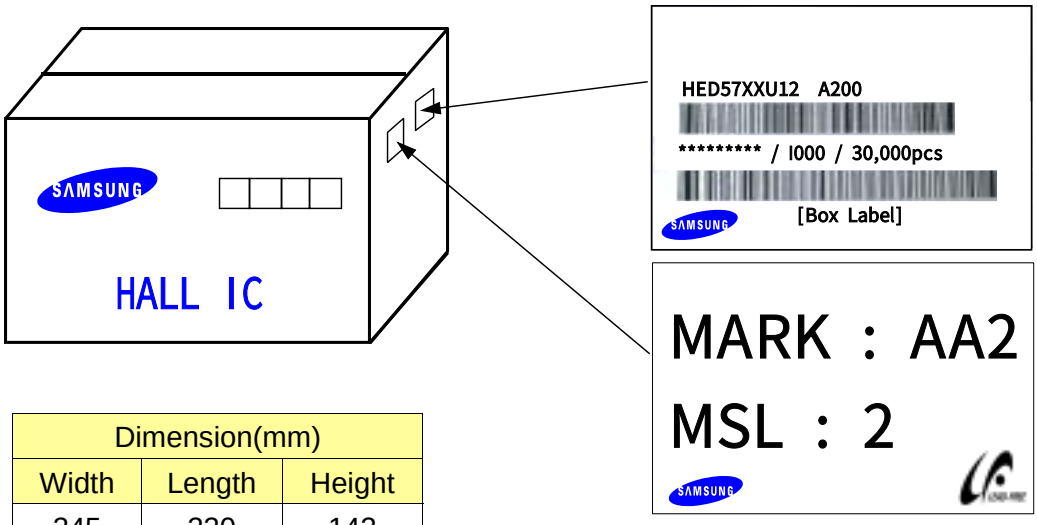
☞ Numbering same method of Reel Label.

[Reel Label]

[Aluminium Bag Label]



[Outer Box Label]



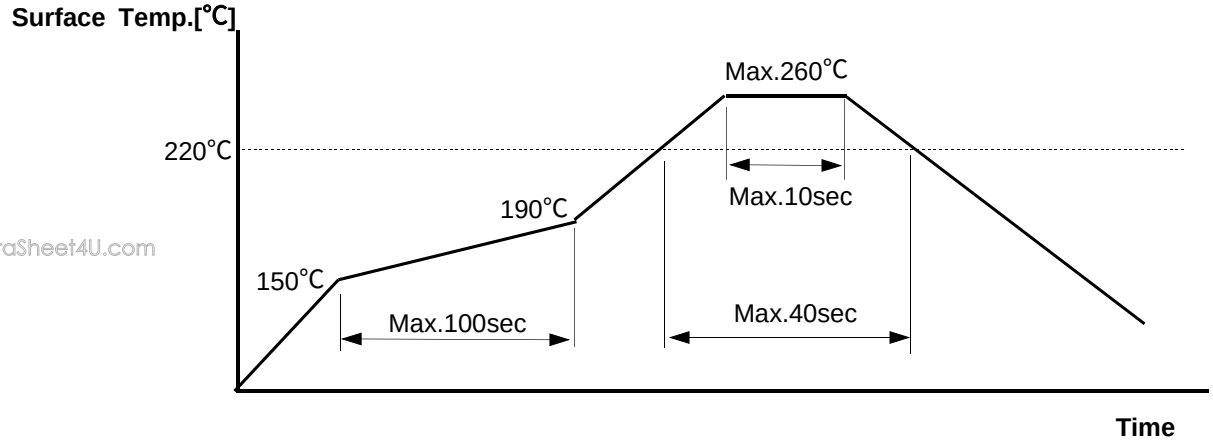
Dimension(mm)		
Width	Length	Height
245	220	142

13. Solder Conditions

13.1 Reflow Conditions(Pb Free)

① No Rapid Heating and Cooling.

② Reflow Frequency : 2 times max.



13.2 For Manual Soldering

- Not more than 5 seconds Max.300℃, under soldering iron.

14. Notes

① Confirm pin connection when circuit designs.

② Use in magnetic field that is strong enough above Bop.
(Magnetic circuit must have effective air gap)

③ Hall IC is sensitive to vertical magnetic field. therefore the sensing face of HALL IC is always opposite to magnetic pole (N or S)

15. RoHS Data

SGS

Test Report No. F690501/LF-CTSGP06-23819 Date: September 19, 2006 Page 1 of 3

To: **SAMSUNG ELECTRO-MECHANICS CO., LTD.**
314 Maetan3-dong
Yeongtonh-gu
Suwon-city
GYEONGGI-DO
Korea

The following merchandise was submitted and identified by the client as :

Commodity	; Hall IC SOT-23
SGS File No.	; GP06-23819
Received Date	; September 12, 2006
Test Performing Date	: September 13, 2006
Test Performed	: SGS Testing Korea tested the sample(s) selected by applicant with following results
Test Results	: For further details, please refer to following page(s)

SGS Testing Korea Co. Ltd.

Jade Jang
Monet Jeong
Jully Oh
Jerry Jung
/Testing Person

Jeff Jang / Chemical Lab Mgr

SGS

Test Report No. F690501/LF-CTSGP06-23819 Date: September 19, 2006 Page 2 of 3

Sample No. : GP06-23819.001

Sample Description : Hall IC SOT-23

Style/Item No. : N/A

Comments : Materials are Si and epoxy.

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996), ICP	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Monobromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.

NOTE: (1) N.D. = Not detected.(<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable

SGS

Test Report No. F690501/LF-CTSGP06-23819 **Date:** September 19, 2006

Picture of Sample as Received:

*** End ***

NOTE: (1) N.D. = Not detected.(<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable